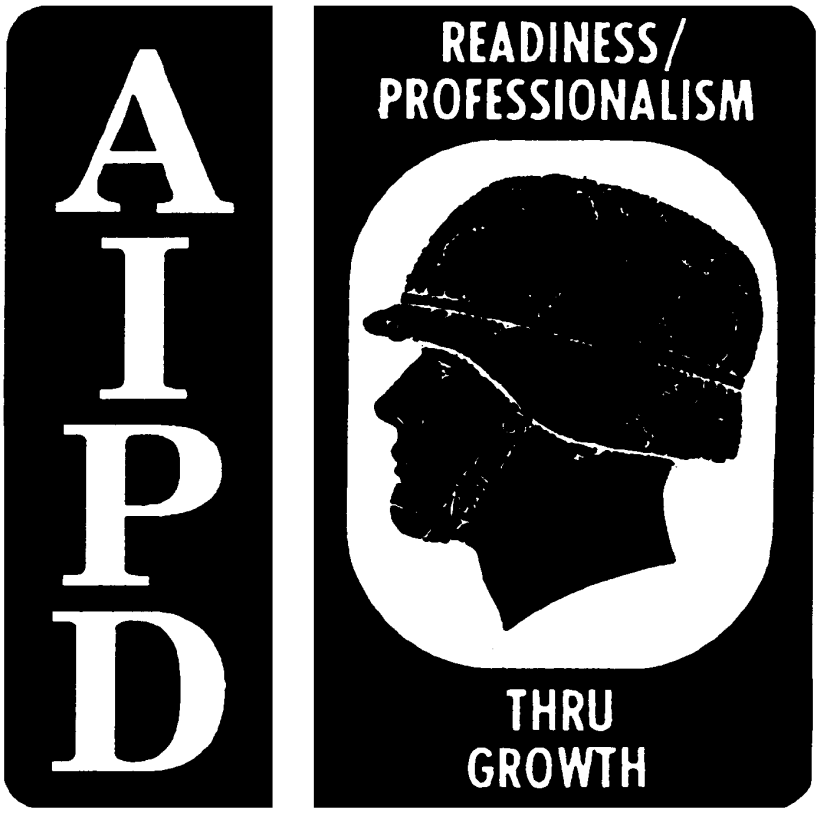
SUBCOURSE
OD1506

EDITION
7

MAINTENANCE OF THE M242 AUTOMATIC GUN



THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT

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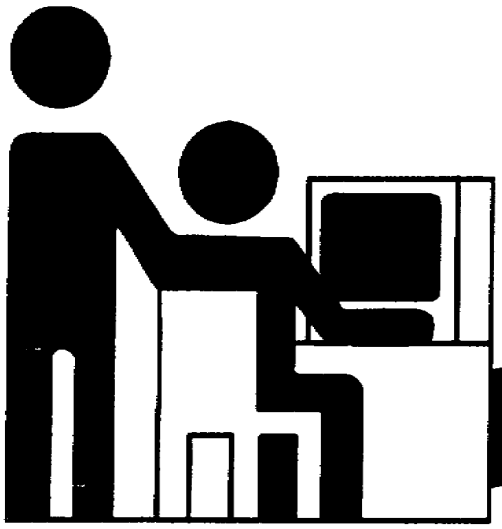

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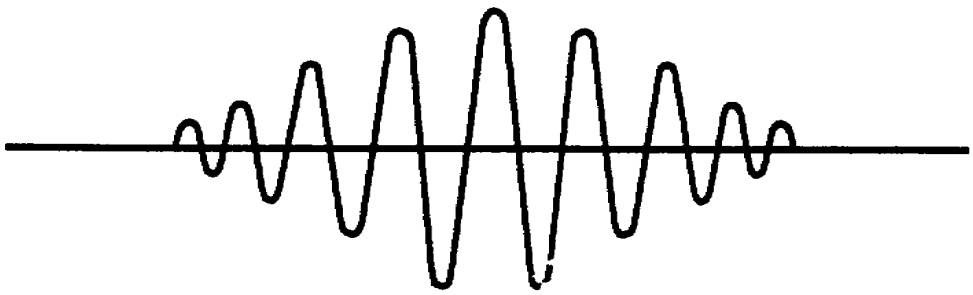
If you have access to a computer with Internet capability and can receive e-mail, we recommend that you use this means to communicate with our subject matter experts. Even if you're not able to receive e-mail, we encourage you to submit content inquiries electronically. Simply include a commercial or DSN phone number and/or address on the form provided. Also, be sure to check the Frequently Asked Questions file at the site before posting your inquiry.



US ARMY TANK TURRET REPAIRER
CORRESPONDENCE COURSE

MOS/SKILL LEVEL: 45K30

MAINTENANCE OF THE M242 AUTOMATIC GUN

SUBCOURSE NO. OD1506

US Army Correspondence
Course Program

7 Credit Hours

GENERAL

The purpose of this subcourse is to increase knowledge of the operation of the M242 machinegun and the maintenance procedures for the feeder assembly, recoil mechanism, and damper assembly.

Seven credit hours are awarded for successful completion of this subcourse. It consists of one lesson and three tasks, outlined as follows:

Lesson 1: OPERATION AND MAINTENANCE OF THE M242 AUTOMATIC GUN

TASK 1: Describe the operation of the M242 automatic gun.

TASK 2: Describe the disassembly, inspection, repair, assembly, and adjustment procedures for the feeder assembly on the M242 automatic gun.

TASK 3: Describe the disassembly, inspection, repair, and assembly procedures for the recoil and damper mechanisms on the M242 automatic gun.

***** IMPORTANT NOTICE *****

THE PASSING SCORE FOR ALL ACCP MATERIAL IS NOW 70%.

PLEASE DISREGARD ALL REFERENCES TO THE 75% REQUIREMENT.

TABLE OF CONTENTS

When used in this publication "he," "him," "his," and "men" represent both the masculine and feminine genders, unless otherwise stated.

STUDENT NOTES

LESSON 1

OPERATION AND MAINTENANCE OF THE
M242 AUTOMATIC GUN

TASK 1. Describe the operation of the M242 automatic gun.

CONDITIONS

Within a self-study environment and given the subcourse text, without assistance.

STANDARDS

Within one hour

REFERENCES

No supplementary references are needed for this task.

1. Introduction

The M242 automatic machinegun is a 25mm gun found on the turret of the infantry and cavalry fighting vehicles. This weapon can be installed or removed in three assembly parts: barrel, feeder, and receiver. The machinegun has both electrical and manual fire control and it is externally powered. It also has a dual feed capability and 25mm ammunition cans that contain 70 rounds of armor piercing (AP), and 230 rounds of high explosive (HE) ammunition. The weapon can also fire single shots of 100 rounds per minute (low rate), or 200 rounds per minute (high rate).

This paragraph provides an overview of the firing operation of the M242 machinegun. When a trigger signal is received, an electric motor drives the track and bolt assembly and the feeder. The feeder places a live round in front of the bolt, and the bolt moves forward and locks. When the round is fired, the bolt unlocks and starts the recocking of the firing pin. The spent case is extracted by the

rearward motion of the bolt. The rotor turns to place the spent round into the eject chute while a new round is placed in front of the bolt. On the next forward motion of the bolt, the spent round is ejected by a finger on the bolt carrier. To prevent the firing of a round in the open bolt position, a hangfire protection system has been provided. If the round in the breech does not fire immediately, the bolt will stop in the misfire position, just before unlocking.

The paragraph above described the firing operation of the M242 machinegun. The following paragraphs will provide detailed information that should be known to better understand this operation.

2. Characteristics, Capabilities, and Features of the M242 Machinegun

a. *General*. The characteristics, capabilities, and features of the M242 machinegun will be described in the following subparagraphs.

b. *Externally Powered (EP).* An electric motor, located on the bottom and to the rear of the receiver assembly drives all the moving parts inside the gun. Ammunition feeding, loading and firing, extraction and ejection are all done by the motor. The gun does not depend on barrel recoil or expanding gases for operation. The gun receiver is solidly attached to a rigid mount and does not recoil when the gun is fired. Only the barrel and breech assemblies recoil.

c. *Safety Protection*. The firing pin is cocked just before firing to ensure safe operation during the ram cycle. The bolt is seared (locked in the open-bolt position) when the trigger is released. A receiver assembly mechanical interlock system stops the gun with the bolt locked in the breech if there is no recoil (round misfires or hangfires). Due to the critical nature of the breech assembly and firing pin for safe and reliable operation of the gun, the breech assembly must be replaced after 25,000 rounds. The firing pin will be replaced after 8000 rounds. This replacement is done without exception.

d. *Quick-Change Capability*. The gun can be removed from a mount and another gun installed in a short time. Two persons can remove the feeder, barrel, and the receiver assemblies quickly.

e. *Equipment Data.*

TABLE 1. EQUIPMENT DATA.

Caliber	25mm (Dual Feed)
Ammunition Data	
U.S. Combat	M791 (APDS-T) M792 (HEI-T)
U.S. Target Practice	M793 (TP-T)
European	Oerlikon KBA Type (all)
Muzzle Velocity	
M792, M793	3610 ft/sec (1100 m/sec)
M791	4462 ft/sec (1360 m/sec)
Weight	
Receiver Assembly	90 lb (40.8 kg)
Barrel Assembly	95 lb (43.0 kg)
Feeder Assembly	59 lb (26.7 kg)
Total Gun System	244 lb (110.5 kg)
Dimensions	
Length Overall	108.7 in (2760mm)
Width	13.0 in (330mm)
Height	15.0 in (380mm)
Length Behind Front of Feed	21 in (533mm)
Barrel Length	80 in (2032mm)
Rate of Fire	Single Shot; 100, 200, 500 spm
Time of Rate	0.15 sec

TABLE 1. EQUIPMENT DATA (Continued).

Time to Stop	0.12 sec
Power Required	
Single Shot, 100, 200 spm	1.5 hp at 28 vdc
500 spm	8.0 hp at 28 vdc
Clearing Method (Cookoff Safe)	Open Bolt
Safety	Absolute Hangfire Protection
Case Ejection	Forward
Peak Recoil Force	10,000 lb (44,448 Newtons)
Dispersion	0.5 mil (18)
Reliability Demonstrated	18,000 MRBF

3. Safety, Care, and Handling of the M242 Machinegun

a. *General*. The paragraphs that follow contain safety warnings, guidelines, and general maintenance instructions that should be followed when performing maintenance procedures on the M242 automatic machinegun.

b. *Preparation for Maintenance*.

(1) *Personnel Safety*. Safety procedures should always be practiced, and all warnings should be read before performing any maintenance procedure.

(2) *Proper Equipment*. The necessary tools and equipment should always be obtained before any maintenance procedure is started. In a maintenance task, the tools and equipment needed to perform the task will be outlined in *Initial Setup*. An example of this is provided in the maintenance procedures found in tasks 2 and 3 of this subcourse.

(3) *Handling Techniques*. Damage to parts during the disassembly, cleaning, inspection, repair, and

assembly procedures should be avoided because nicks, scratches, and dents caused by careless handling could result in equipment failure.

(4) *What to Discard*. The parts that are to be discarded, such as packings and cotter pins, are identified in the maintenance tasks. If the step does not say to discard a part, the part should be saved for later use.

(5) *Identification*. During disassembly, tag leads on electrical parts to ensure proper assembly. Be sure to tag each lead as it is removed.

(6) *Torquing*. Where needed, torque values are listed in the maintenance task. The torque values given in a maintenance task are the actual values that must be applied to the nut or screw for proper maintenance. Some tasks require the use of a torque wrench adapter when the nut or screw cannot be reached with a regular socket on the end of the torque wrench. These adapters add to the overall length of the torque wrench and make the dial or scale reading less than the actual torque applied to the nut or screw.

NOTE

To prevent overtorquing and damage to equipment, the corrected dial or scale reading must be calculated.

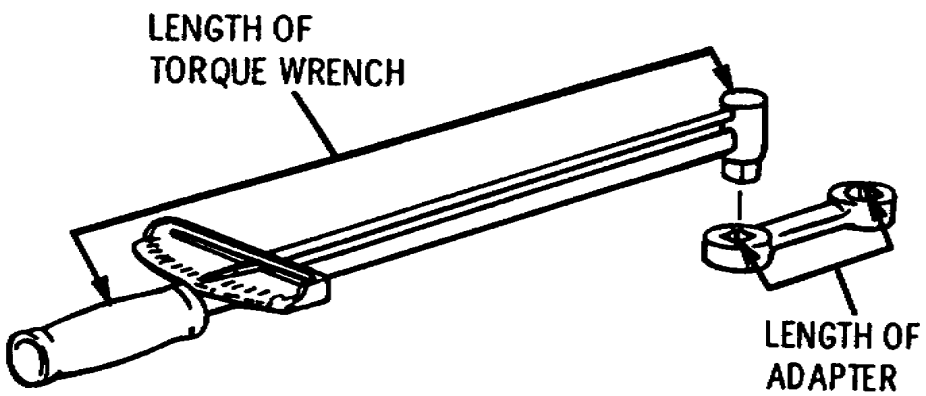
(a) To determine the corrected scale or dial reading, when using an adapter, use the measurement guidelines in the next paragraph. The formula for calculating a corrected scale or dial reading is in the next paragraph. Use the formula while referring to the example.

The length of the torque wrench is measured from the center of the handle to the center of the drive. The length of the adapter is measured from the center of the drive to the center of the wrench (see figure 1 on the following page).

Formula:

A corrected reading equals the length of the torque wrench plus the length of the adapter divided by the length of the torque wrench divided into the required torque value.

FIGURE 1. DETERMINING LENGTH OF TORQUE WRENCH AND ADAPTER.



To clarify the above statement, an example of how to obtain a corrected reading is provided below.

Example: Required torque is 270 - 300 in-lb. Length of torque wrench is 22 inches. Length of adapter is three inches.

(b) **Corrected reading =**

$$\frac{270 \text{ in-lb}}{\dfrac{22 \text{ inches} + 3 \text{ inches}}{22 \text{ inches}}}$$

$$\text{Corrected reading} = \frac{270 \text{ in-lb}}{\dfrac{25 \text{ inches}}{22 \text{ inches}}}$$

$$\text{Corrected reading} = \frac{270 \text{ in-lb}}{1.14}$$

$$\text{Corrected reading} = 237 \text{ in-lb}$$

(c) **Corrected reading =**

$$\frac{300 \text{ in-lb}}{\frac{22 \text{ inches} + 3 \text{ inches}}{22 \text{ inches}}}$$

$$\text{Corrected reading} = \frac{300 \text{ in-lb}}{\frac{25 \text{ inches}}{22 \text{ inches}}}$$

$$\text{Corrected reading} = \frac{300 \text{ in-lb}}{1.14}$$

$$\text{Corrected reading} = 263 \text{ in-lb}$$

From the above examples, it has been determined that the required torque for a torque wrench of 22 inches and an adapter of three inches is 237 - 263 in-lb.

c. *Cleaning.*

(1) *General.* Cleaning is very important. All parts must be cleaned well and kept clean during the maintenance procedure. Dirt or foreign matter can cause malfunctions and equipment failure. Cleaning procedures are covered in the maintenance task when relating to a specific part.

(2) *Avoid Abrasives.* Except where called for in a maintenance task, do not use abrasives, files, wire brushes or sharp tools. On some surfaces, the finish is important to the operation of close fitting parts.

(3) *Removal Agents.* Remove gum or old grease deposits by soaking parts in cleaning solvent. Scrub parts with a brush and use a crocus cloth to remove minor surface defects.

(4) *Cleaning Instructions.* Care is needed in all cleaning procedures. Dirt can damage parts and cause malfunctions. When performing any cleaning procedure, do the following:

(a) Clean all parts before inspection, after repair, and before assembly.

(b) Keep hands free of grease because grease collects dirt.

(c) After cleaning, cover or wrap parts to protect them from dirt.

CAUTION

Cleaning solvent causes leather, rubber, and synthetic materials to become brittle. Do not use cleaning solvent to clean seals.

(d) Clean seals with soap and water and dry parts with a clean wiping rag.

(e) Blow out insert holes with compressed air.

d. *Inspection*. All removed parts must be inspected with care. Parts must be replaced if damage or wear exceeds allowable limits specified in the maintenance task.

(1) *Bearings*. Inspect bearings for free and smooth rotation, and broken or missing balls or rollers. Also look for tightness of fit in bearing bores. Bearing races should be inspected for wear and color changes due to heat.

(2) *Bushings, and Bushing-Type Bearings*. Check all bushings and bushing-type bearings for secure fit in casting and check for color changes which could mean overheating. An inspection should be made for size, scoring, out-of-roundness, burrs, sharp edges, and signs of seizing. Check for dirt in oil holes and in bushing-type bearings. If dirt is found in the oil holes and grooves, they must be cleaned out.

(3) *Preformed Packings and Gaskets*. Inspect preformed packings for wear, brittleness, cracks, cuts, and damage. Gaskets and seals should also be inspected for wear, nicks, cuts, and torn or missing gasket material. Replace gaskets if needed, but remember that gaskets and seals on electrical parts may be reused.

(4) *Inserts*. Inspect inserts for cracks, stripped or damaged threads, and for loose fit.

(5) *Studs*. Inspect all studs for stripped or damaged threads, bent or loose conditions, and signs of stretching.

(6) *Gears*. Inspect gears for burrs, wear, cracked or broken teeth, and pitting at tooth contact areas.

(7) *Splined Parts*. Inspect splined parts for burrs, wear, twisted, cracked, or broken splines.

(8) *Threaded Parts*. Inspect all threaded parts for burrs, and stripped or damaged threads.

(9) *Springs*. Inspect springs for wear, defects, breaks, and loss of tension or compression. Load and height inspection data, where needed, are given in maintenance procedures.

(10) *Retaining Rings*. Inspect retaining rings for nicks, burrs, defects, loss of tension, and wear.

(11) *Electrical Parts*. Inspect electrical parts before installing them. Look for mildew, corroded, or burned parts. Inspect wire insulation for cracks, tears, burns, or missing material.

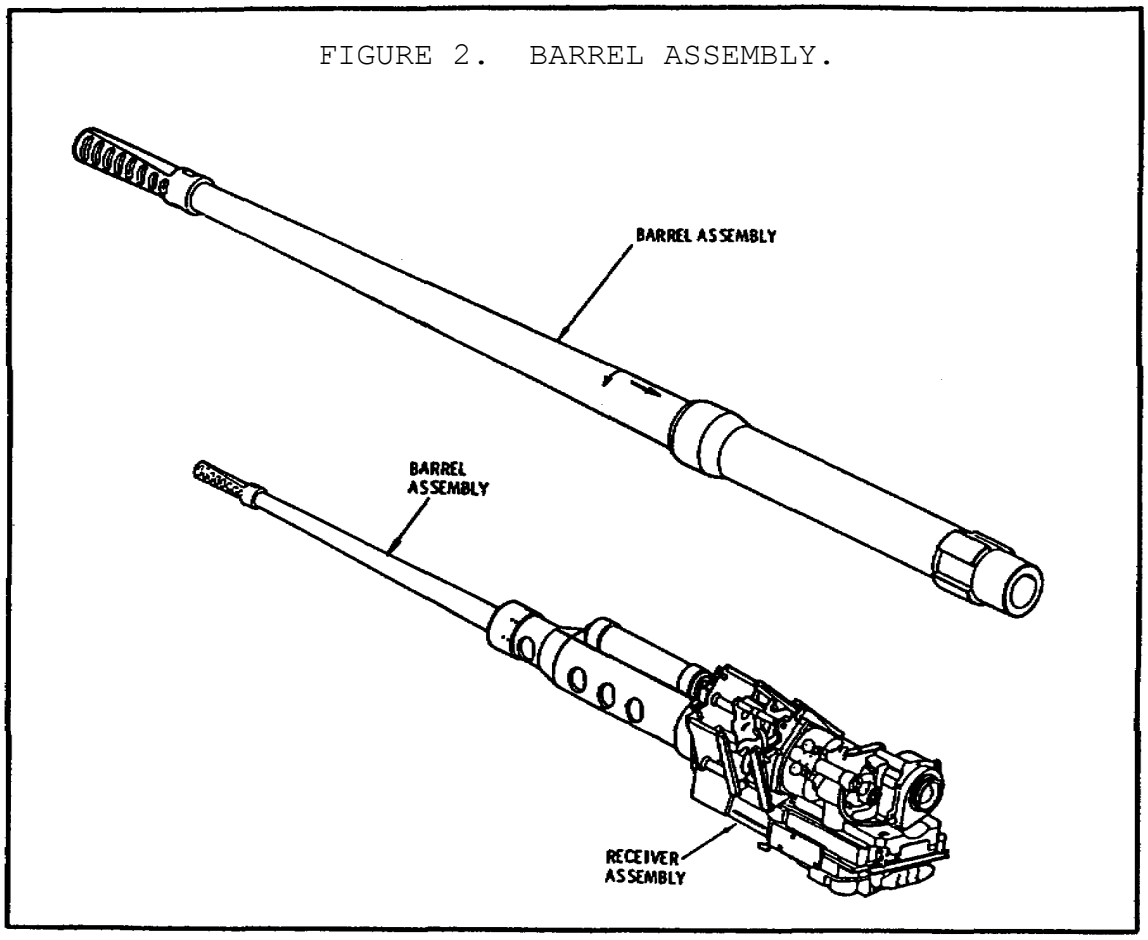
e. *Lubrication*. Lubrication is very critical for the smooth and reliable operation of parts. It is essential that only the specified lubricant be applied to those surfaces of parts identified under the *Lubrication* heading in a maintenance task. Avoid applying excessive amounts of lubricant as this will trap dirt and grit which may cause the early failure of a part or component.

4. Location and Description of the Major Components of the M242 Automatic Gun

a. *General*. The three major components of the M242 machinegun are the barrel assembly, feeder assembly, and the receiver assembly. Provided below is a description of these components and their location on the machinegun.

b. *Barrel Assembly* (see figure 2 on the following page). The barrel assembly gives directional control to the projectile, and brakes some of the

FIGURE 2. BARREL ASSEMBLY.



barrel recoil. The barrel assembly mounts in the front end of the receiver assembly.

c. *Feeder Assembly* (see figure 3 on the following page). The feeder assembly, mounted on top of the receiver assembly, performs several functions. They are:

(1) Removes linked ammunition from chutes.

(2) Strips rounds from links.

(3) Places round into face of bolt.

(4) Removes spent cartridge case from face of bolt.

(5) Provides a means of selecting either one of two types of available ammunition.

FIGURE 3. FEEDER ASSEMBLY.

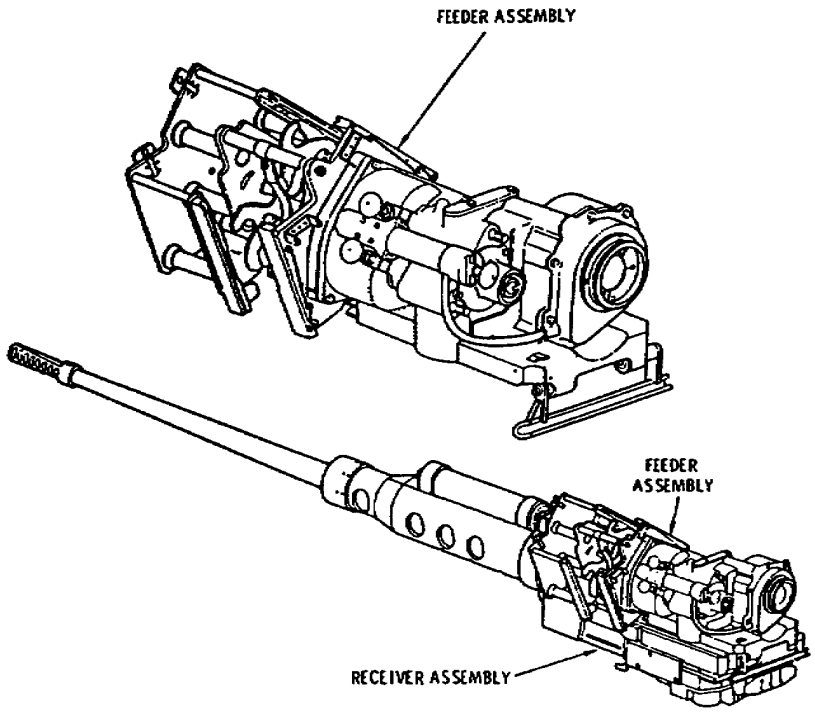
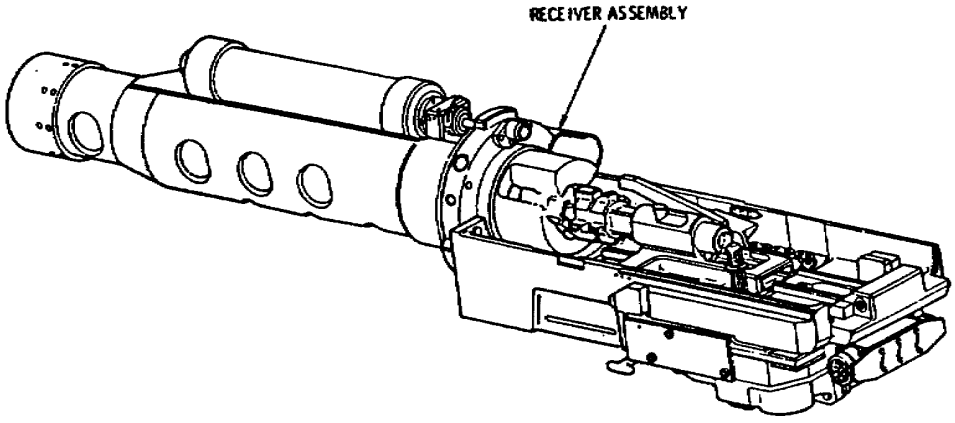


FIGURE 4. RECEIVER ASSEMBLY.



d. *Receiver Assembly* (see figure 4 on the previous page). The receiver assembly rams and fires the rounds, extracts and ejects spent cartridge cases, and suppresses the recoil force from the barrel and breech. The receiver assembly also provides a means of securing the gun to a mount.

5. Operation of the Barrel Assembly

a. *Barrel Assembly*. The barrel assembly (figure 5) gives directional control to a projectile. The following components of the barrel assembly describes how this is performed:

(1) *Barrel*.

(a) Receives rounds in the cartridge chamber at breech end of barrel.

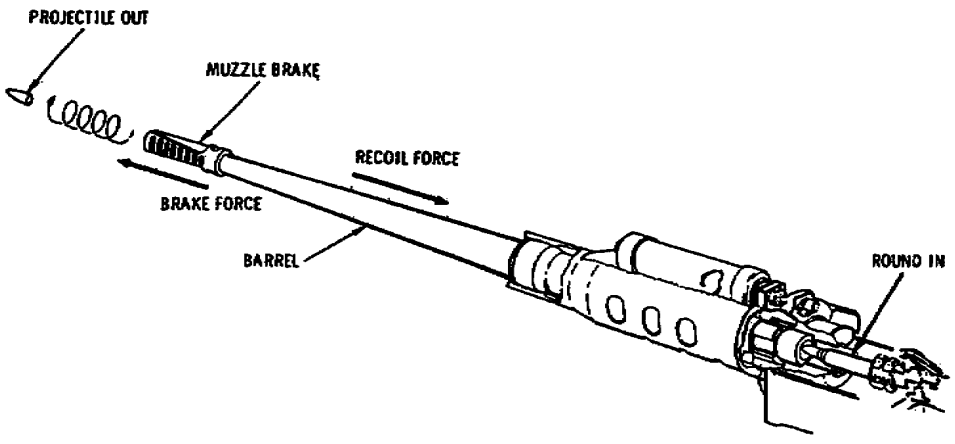
(b) Helps contain explosive force when round fires.

(c) Develops a right-spin rotation to projectile.

(2) *Muzzle Brake*.

(a) Counters some explosive recoil force.

FIGURE 5. OPERATION OF THE BARREL ASSEMBLY.



(b) Disperses muzzle blast.

(c) Reduces blast flash.

6. Operation of the Feeder Assembly

a. *Feeder Assembly Forward Feed Section* (see figure 6 on the following page). The forward feed section pulls linked rounds into the gun; separates the rounds and links; places rounds in the bolt face; removes spent round cases from the bolt face; and aids in ejecting spent cases from the gun. The operation of the forward feed section is performed by the following components:

(1) *Forward Feed Assembly*.

(a) Supports upper and lower sprocket assemblies.

(b) Supports rotor.

(c) Provides mounting for the forward feed gate, lower round guide, and the two forward link strippers.

(d) Provides a mounting bracket for the forward end of the feed chutes.

(e) Supports the forward end of the ejection chute.

(2) *Upper Sprocket*. The upper sprocket strips armor piercing (AP) rounds from links and places them in the rotor.

(3) *Lower Sprocket*. The lower sprocket strips high explosive (HE) rounds from links and places them in the rotor.

(4) *Round Positioner*. The round positioner guides and positions the rounds during transfer from sprocket to rotor.

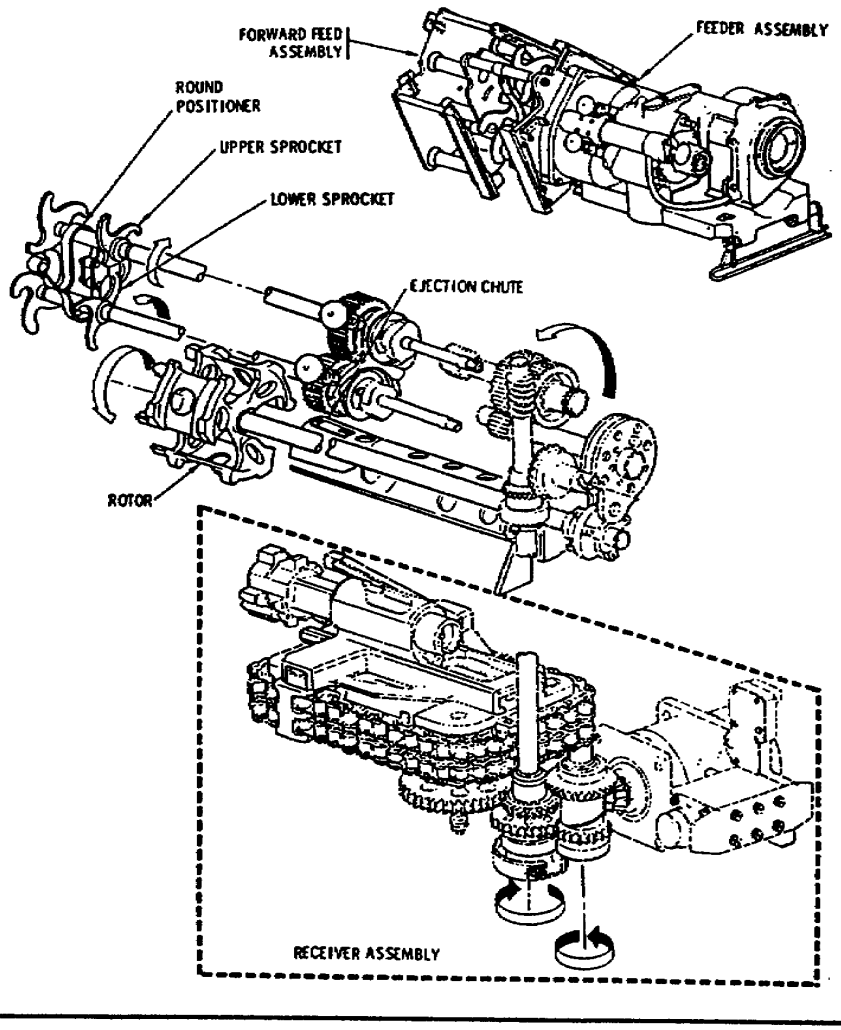
(5) *Rotor*.

(a) Takes rounds from the sprockets.

(b) Positions rounds in bolt face.

(c) Moves spent cases in front of the ejector.

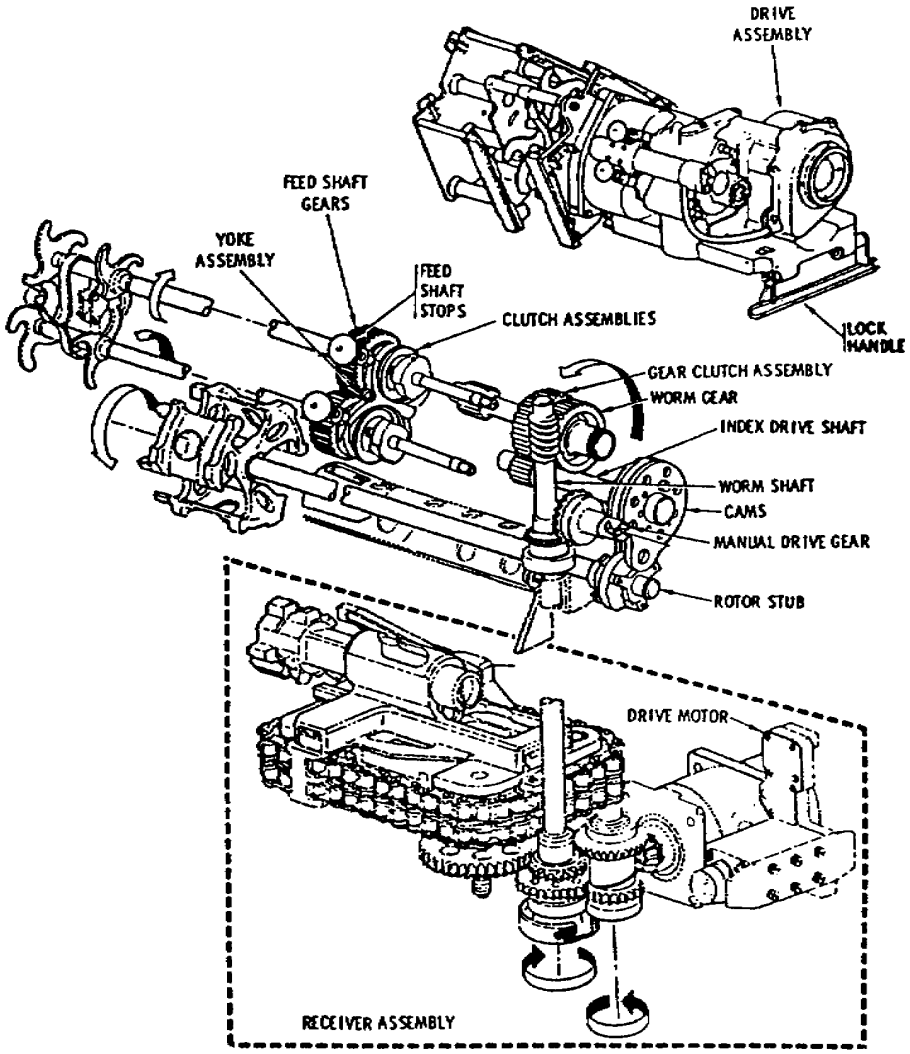
FIGURE 6. OPERATION OF THE FEEDER ASSEMBLY FORWARD FEED SECTION.



(6) *Ejection Chutes.* The ejection chute guides spent cases to the eject port on the receiver.

b. *Drive Assembly* (see figure 7 on the following page). The drive assembly mounts and drives the forward feeder section components and controls the feed selection. The drive assembly also provides a means to manually operate the gun during a power failure, and sends electrical signals to the turret

FIGURE 7. OPERATION OF THE DRIVE ASSEMBLY.



controls indicating the position of the bolt. The operation of the drive assembly is performed by the following components:

(1) *Wormshaft Assembly*. Driven by the receiver drive shaft, the wormshaft assembly turns the wormgear, and provides a means to manually operate the gun with the manual drive gear.

(2) *Wormgear.* Drives the gear clutch assembly.

(3) *Gear Clutch Assembly.* The clutch gear shaft, of the gear clutch assembly, drives the upper feed shaft spur gear and the index drive shaft with the clutch spur gear. The gear clutch assembly also provides for timing the index drive section with the feed shaft section. This timing is important because the clutch will slip if the feeder jams.

(4) *Upper Feed Shaft Gear.* Drives the lower feed shaft gear and the upper clutch assembly (when engaged by the feed select solenoid).

(5) *Lower Feed Shaft Gear.* Drives the lower clutch assembly (when engaged by the feed select solenoid).

NOTE

The lower feed shaft and clutch assembly operates the same as the upper feed shaft and clutch assembly.

(6) *Upper Clutch Assembly.* Drives the feed shaft (when engaged) which in turn drives the upper feed sprocket.

(7) *Upper Feed Shaft.* Drives the upper feed sprocket (when engaged) which in turn strips rounds from links. Contains lugs that mate with the feed shaft stops.

(8) *Yoke Assembly.* Rotated by the feed select solenoid, the yoke assembly engages or disengages the clutch assemblies when the feed selection is changed by the feed select solenoid either manually or electrically.

(9) *Index Drive Shaft.* Driven by the gear clutch assembly, the index drive shaft is timed with the gear clutch assembly and rotates the rotor stub, which provides the sprockets with proper ratio to the rotor. The index drive shaft also rotates the control cam to give the position of the bolt.

NOTE

The index drive cam set is connected to the index drive shaft, and is a matched set with the rotor stub.

(10) *Rotor Stub.* Drives the rotor and provides the proper ratio between the sprocket and rotor.

(11) *Lock Handle.* Locks the feeder to the receiver and provides a quick disconnect between the feeder and receiver electrical connectors when the handle is in the unlocked position.

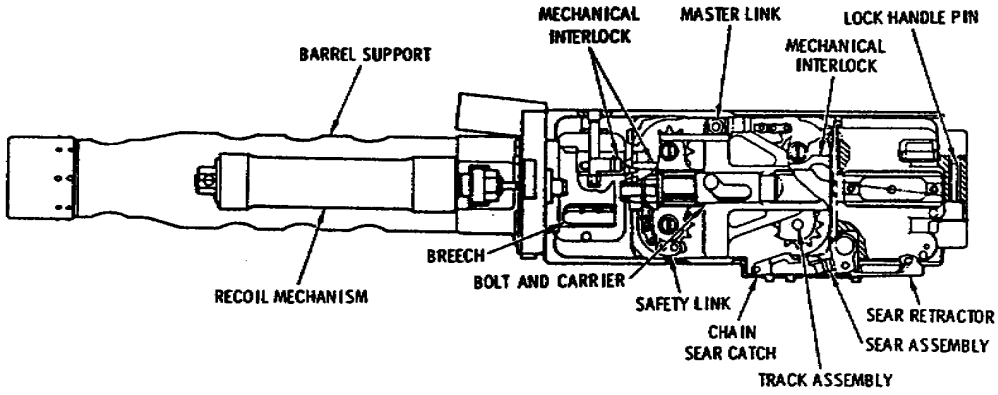
(12) *Feed Select Solenoid.* Provides manual or electrical selection of ammunition type (AP or HE).

7. Operation of the Receiver Assembly

a. *Receiver Assembly* (figure 8). The receiver assembly rams and fires rounds, extracts and ejects spent cases or unfired rounds, and contains a mechanical interlock system that stops the gun if a round misfires or hangfires. The receiver assembly consists of the receiver gears, track assembly, bolt and carrier assembly, receiver housing, and includes the following subassemblies:

(1) *Barrel Support.* Holds breech in receiver and supports barrel.

FIGURE 8. OPERATION OF THE RECEIVER ASSEMBLY.



(2) *Recoil Mechanism*. Absorbs most of the recoil force when a round fires.

(3) *Breech*. Fits into front end of receiver and around barrel. Breech and bolt lugs lock to contain explosive force when round fires.

(4) *Sear Assembly*. Controlled by the sear solenoid and mechanical interlock. Locks chain assembly in the event of misfire, by engaging the safety link, and in the sear position, by engaging the master link.

(5) *Chain Sear Catch*. Keeps chain from rotating backward during firing recoil.

(6) *Sear Retractor*. Provides a means to manually disengage the sear assembly during manual emergency operation.

(7) *Mechanical Interlock*. Engages sear, to stop bolt from being unlocked from breech if there is no recoil (round misfires or hangfires).

(8) *Motor*. Drives gears and mechanism required to operate gun.

(9) *Handle Lockpin*. Applies spring tension to lock handle on one side and provides a lock on the opposite side.

(10) *Sear Solenoid*. Provides electrical control of sear through the sear push rod.

(11) *Receiver Housing*. Contains or provides attachment for all receiver assembly components and subassemblies.

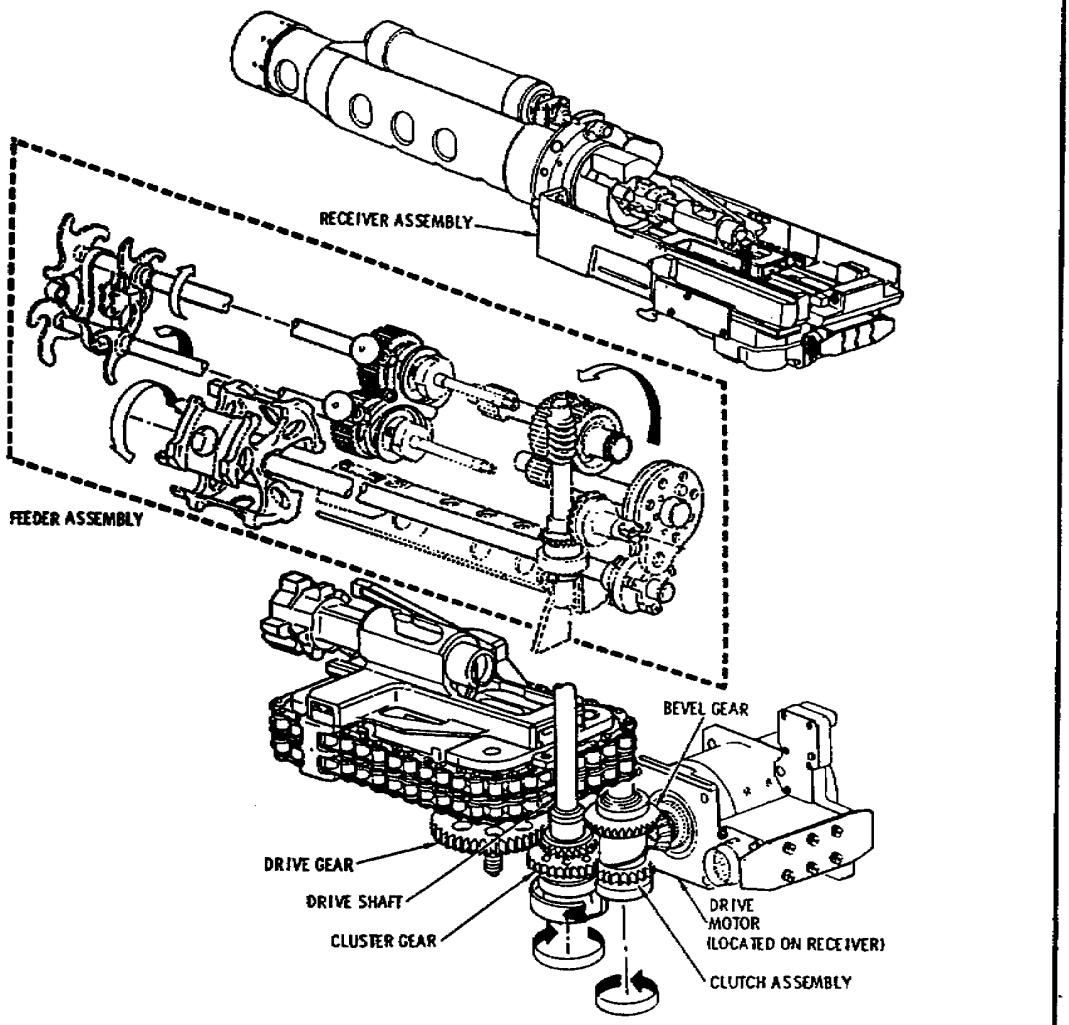
b. *Receiver Gears* (see figure 9 on the following page). Driven by the motor, the receiver gear operates as follows:

(1) *Bevel Gears*. The small bevel gear, mounted on the motor shaft, drives the large bevel gear, which in turn, drives the clutch assembly.

(2) *Clutch*. Drives cluster gear. If gun jams, clutch slips to prevent damage to drive train.

(3) *Cluster Gear*. Drives the drive shaft and drive gear.

FIGURE 9. OPERATION OF THE RECEIVER GEARS.

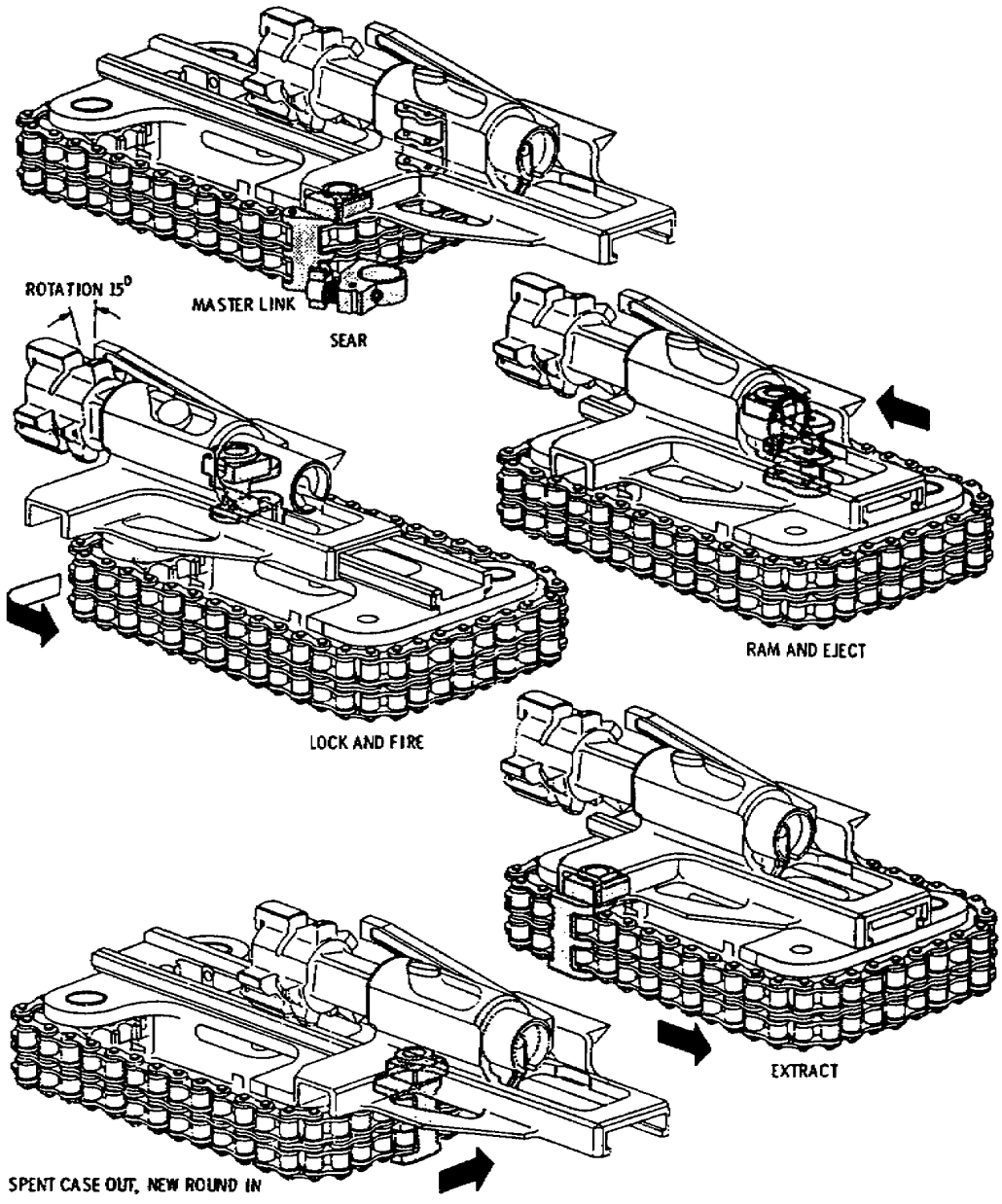


(4) *Drive Shaft.* Drives the feeder drive assembly at top of drive shaft.

(5) *Drive Gear.* Drives the drive sprocket in the bolt and track assembly.

c. *Track Assembly* (see figure 10 on the following page). The track assembly is driven by the track drive sprocket. Components and operation of the track assembly during each complete cycle are described next.

FIGURE 10. OPERATION OF THE TRACK ASSEMBLY.



(1) Sear assembly engages master link and positions the chain before firing.

(2) After sear release, drive sprocket drives the chain including master link and master link slider.

(3) Master link slider fits into the slider path in the bolt and carrier assembly. As chain rotates (counterclockwise) around sprockets, the slider moves the bolt and carrier forward and backward.

(4) When bolt carrier is in the forward position, the slider moves from right to left across the carrier slider path (firing dwell time to allow hot gases to escape).

(5) When bolt carrier is in the rear position, the slider moves from left to right across the carrier slider path (feed dwell time to allow a new round to be positioned in the bolt face, and the spent case positioned in front of the ejector).

d. *Bolt and Carrier* (see figure 11 on the following page). Driven by track assembly, the bolt and carrier components and operations during one complete cycle are described next.

(1) When the bolt carrier is in the rear position, the rotor positions a new round in the bolt face.

(2) Rotation of the chain assembly (counterclockwise) moves the bolt carrier forward. In the forward position, locking lugs on the bolt lock into the breech locking lugs.

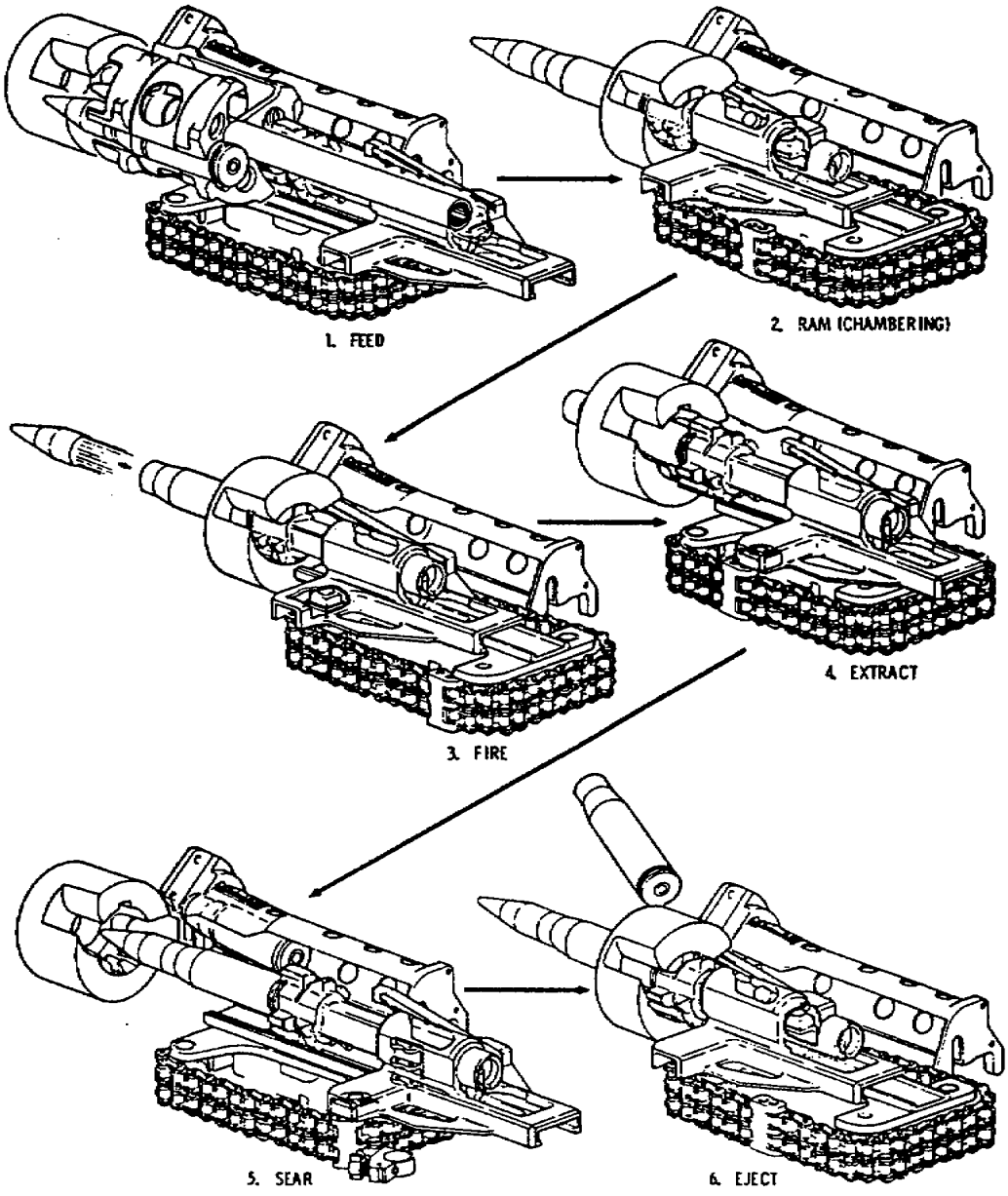
(3) Firing pin then releases, firing the round.

(4) Bolt and carrier starts to move to the rear unlocking the bolt and breech lugs and recocking the firing pin.

(5) In sear position, the rotor sweeps the spent case from the bolt and positions a new round in the bolt face.

(6) Bolt and carrier move forward with the new round, and the ejector on the bolt carrier pushes the spent case out of the receiver at the same time.

FIGURE 11. OPERATION OF THE BOLT AND CARRIER.

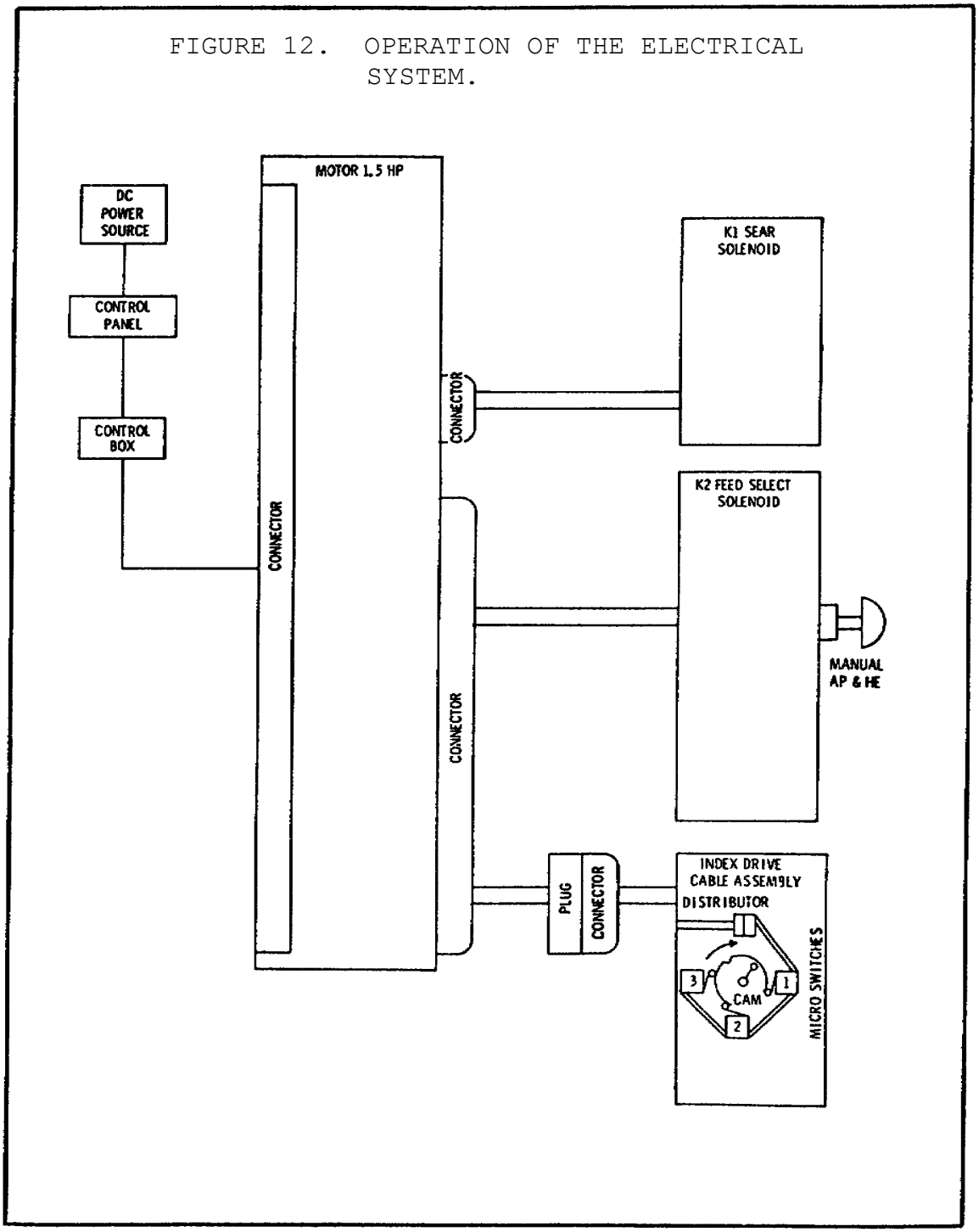


8. Operation of the Electrical System

a. *Electrical System.* The electrical system (see figure 12 on the following page) consists of the motor, solenoid, and cable assembly. Component functions are:

(1) *Motor.* Operates on voltages between 18 and 30 volts direct current (vdc) and drives the receiver gears. Contains junction and connectors for interface between receiver and feeder assemblies.

FIGURE 12. OPERATION OF THE ELECTRICAL SYSTEM.



(2) *Sear Solenoid.* Controls sear by moving sear push rod.

(3) *Feed Select Solenoid.* Provides manual and electrical selection of armor piercing (AP) and high explosive (HE) ammunition. Sends an electrical signal to the control panel to indicate ammunition selection. Contains connector for interface between feeder and receiver.

(4) *Index Drive Cable Assembly.* Provides sensing of the bolt position through a series of three microswitches. Sends electrical signals through the feed select solenoid cable to the control box and control panel to provide the necessary control and indication functions (normal shutdown, seared, or breech locked).

9. Conclusion

This concludes the discussion of the operation of the M242 automatic machinegun. The next two tasks will provide examples of intermediate direct support (IDS) maintenance procedures that are used to repair the machinegun when unit maintenance has determined that it is nonoperational.

LESSON 1

OPERATION AND MAINTENANCE OF THE
M242 AUTOMATIC GUN

TASK 2. Describe the disassembly, inspection, repair, assembly, and adjustment procedures for the feeder assembly on the M242 automatic gun.

CONDITIONS

Within a self-study environment and given the subcourse text, without assistance.

STANDARDS

Within 3 hours

REFERENCES

No supplementary references are needed for this task.

1. Introduction

The feeder assembly is a major component of the automatic machinegun. When the feeder assembly is inoperative, the machinegun will not function. The responsibility of repairing or replacing the components of the feeder assembly rests upon intermediate direct support (IDS) maintenance. The feeder assembly is removed from the M242 machinegun by unit maintenance and given to IDS for repair or replacement.

The following maintenance procedures are provided to give the mechanic a general idea of the steps that should be followed during the repair or replacement of components of the feeder assembly.

2. Maintenance of Feeder Assembly

a. *General*. Feeder assembly maintenance tasks are used to repair or replace intermediate direct support (IDS) level assemblies or subassemblies when they are received from unit maintenance. The feeder assembly repair or replacement tasks that will be covered in this task may cover removal, disassembly, cleaning, inspection/repair, lubrication, assembly, and/or testing and are:

(1) Repair Feeder Drive Assembly: Replace Feed Select Solenoid

(2) Repair Feeder Drive Assembly: Repair Feed Shaft, Index Drive Assembly, and Wormshaft Assembly

(3) Repair Feeder Drive Assembly: Repair Gear Clutch Assembly

(4) Repair Forward Feed Assembly

b. *Replace Feed Select Solenoid*. This task will cover the removal, inspection, and installation of the feed select solenoid.

(1) *Initial Setup*.

(a) *Applicable Configurations*. All.

(b) *Tools*. Small arms repairer tool kits.

(c) *Materials/Parts*. Feed select solenoid, two hex self-locking nuts.

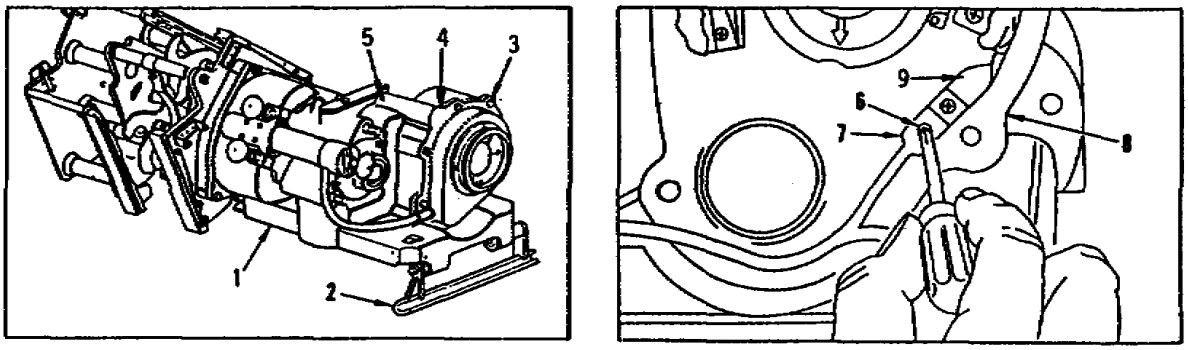
(d) *Personnel Required*. Small arms repairer and helper.

(e) *Equipment Conditions*. Feeder assembly removed.

(2) *Procedural Steps for Removal of the Feed Select Solenoid*.

Step 1. Place feeder assembly (1)(figure 13 on the following page) on a clean, flat surface with feeder handle (2) in the down position.

FIGURE 13. POSITIONING FEEDER ASSEMBLY, REMOVING COVER ASSEMBLY, AND DISCONNECTING SOLENOID CABLE CONNECTOR.



Step 2. Using a 5mm hex key, remove seven socket head capscrews (3) from cover assembly (4). Then, pull cover assembly (4) from feeder drive (5).

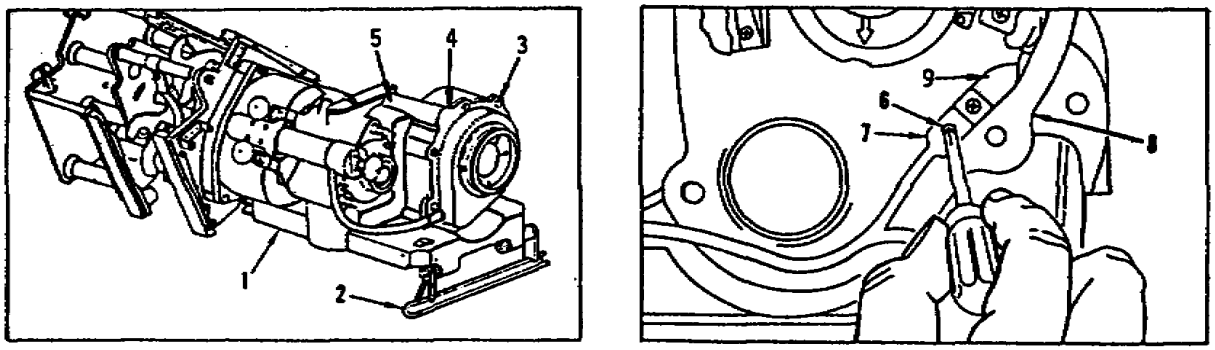
Step 3. Using a crosstip screwdriver, remove screw (6) from the solenoid cable connector (7) on the index drive housing cover (8). Then, pull solenoid cable connector (7) out of cable assembly connector (9).

Step 4. Turn feeder assembly on its side so that the electrical connector (10) (see figure 14 on the following page) is on top. Using a flat-tip screwdriver and a 5/32 inch socket with spin handle, remove nuts (11), spacers (12), and guide pins (13), then discard nuts (11).

NOTE

A screwdriver would be used to pry on rubber part of connector if needed to remove connector from bracket.

FIGURE 14. REMOVING ELECTRICAL CONNECTOR AND FEED SELECT SOLENOID.



Step 5. Pull electrical connector (10) out of bracket (14), then push electrical connector through hole (15) in feeder drive assembly (5).

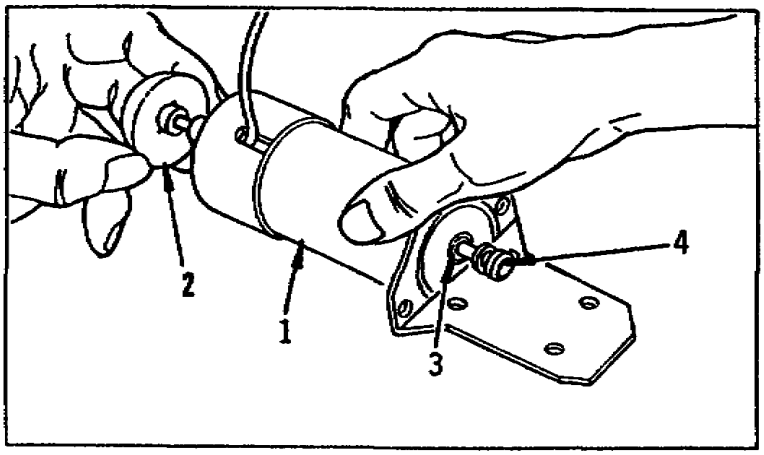
Step 6. Place feeder assembly (1) against work surface with feed select solenoid (16) positioned as shown in figure 14. Using a 5mm hex key, remove six socket head capscrews (17), then lift feed select solenoid (16) from feeder drive assembly (5).

(3) *Procedural Steps for Inspection of the Feed Select Solenoid* (see figure 15 on the following page).

Step 1. Visually check the new feed select solenoid (1) for oil leakage, moisture, cracks, bends, broken parts, broken or frayed cable, or bent or broken connector pins.

Step 2. Another new feed select solenoid would be obtained if the conditions in step 1 were found. Step 1 would be repeated for any replacement solenoid.

FIGURE 15. INSPECTING NEW FEED SELECT SOLENOID.



Step 3. Push red select knob (2) in until it stops. Using a six inch rule, measure the distance from base of flange (3) to tip of plunger (4). Record measurement.

Step 4. Pull red select knob (2) out until it stops. Using six inch rule, measure the distance from base of flange (3) to tip of plunger (4). Plunger travel should be 17/32 ± 1/16 inch (13.5 ± 1.6mm).

Step 5. If plunger travel is not correct, a new feed select solenoid would be obtained. Repeat steps 1 through 4 for any replacement solenoid.

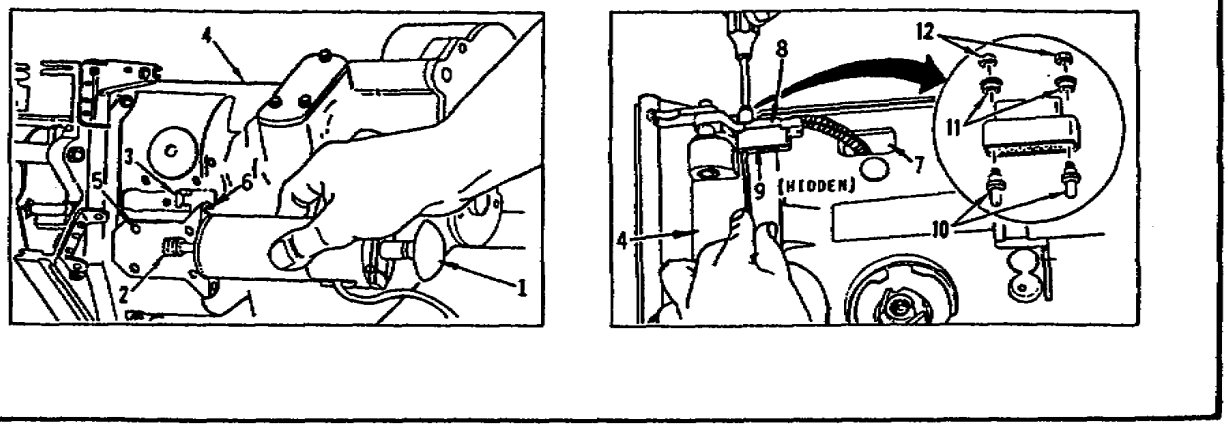
(4) *Procedural Steps for Installation of the Feed Select Solenoid.*

Step 1. Push red select knob (1) in until it stops (see figure 16 on the following page).

Step 2. Place plunger tip (2) into fork actuator T-slot (3) in feeder drive assembly (4). Align mounting holes as shown in figure 16.

Step 3. Using a 65m socket wrench attachment and torque wrench, install and torque four socket head capscrews (5) to 80 ± 5.0 in-lb (92 ± 6.0 cm-kg).

FIGURE 16. INSTALLING NEW FEED SELECT SOLENOID AND ELECTRICAL CONNECTOR.



Step 4. Using a 5mm hex key, install and tighten two screws (6). Then, position feeder drive assembly (4) on its side with hole (7) on top as shown in figure 16.

Step 5. Feed electrical connector (8) through hole (7) in feeder drive assembly (4), and insert electrical connector into bracket (9) with pin side of electrical connector (8) down as shown in figure 16.

Step 6. Install two guide pins (10) through electrical connector and bracket, and using a flat-tip screwdriver and 5/32 inch socket with spin handle, hold guide pins (10) and install spacers (11). Secure spacers with two new self-locking nuts (12).

Step 7. Place feeder assembly (13) with feeder handle (14) on bottom as shown in figure 17 on the following page.

Step 8. Connect solenoid cable connector (15) to cable assembly connector (16) and using crosstip screwdriver, install screw (17) on solenoid cable connector (15).

FIGURE 17. INSTALLING SOLENOID CABLE CONNECTOR.

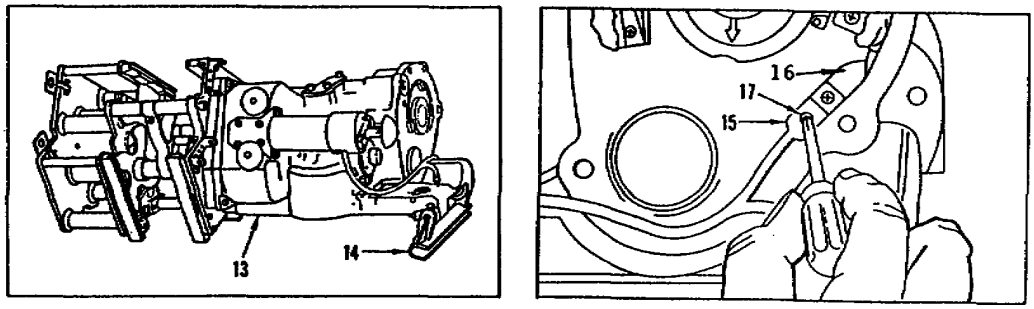
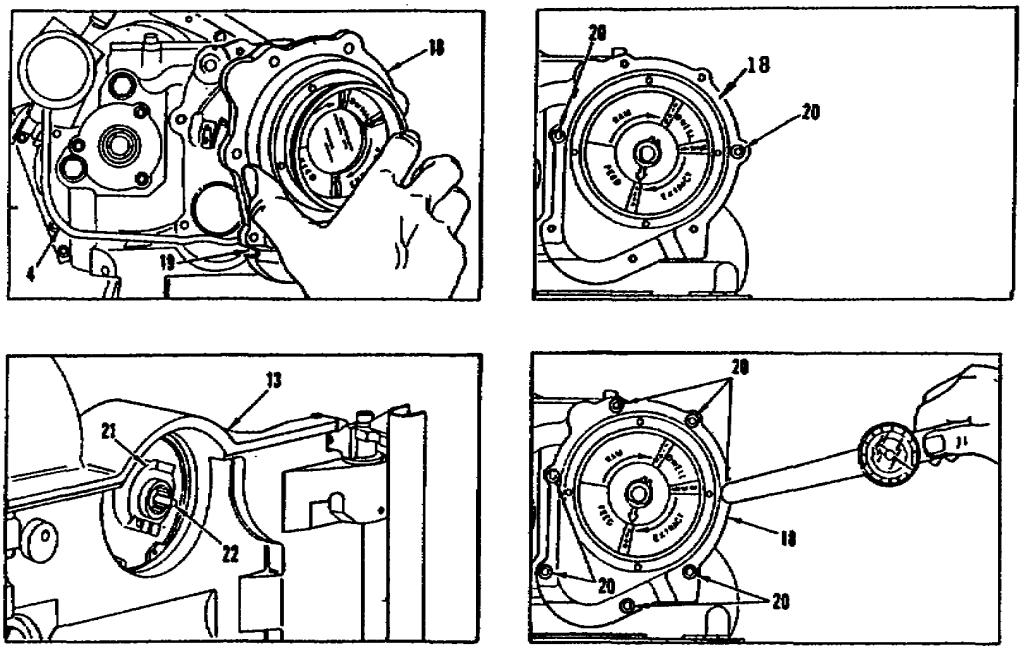


FIGURE 18. INSTALLING COVER ASSEMBLY.



Step 9. Align cover assembly (18) (figure 18 on the previous page) with feeder drive assembly (4) so solenoid cable fits into the cutout (19) of cover.

Step 10. Using a 5mm socket wrench attachment, install two opposing socket head capscrews (20), tighten until snug, and back off 1/4 to 1/2 turn.

Step 11. Position feeder assembly (13) on side. Rotate wormshaft nut (21) counterclockwise until feeder assembly (13) locks in the sear position. Trip feeder assembly (13) out of sear by pressing in rod (22) and turning wormshaft nut (21) counterclockwise two complete turns. Feel for binding as wormshaft nut (21) is turned.

(a) If no binding is found, repeat step 11 in its entirety to make certain that no binding occurs anywhere else.

(b) If binding occurs, slightly shift the position of the cover assembly by repositioning with the hand. Repeat step 11 as required until the binding has either been removed or reduced as much as possible.

Step 12. Position feeder assembly as shown, then snug down the two installed socket head capscrews (20). Install and snug down the remaining five socket head capscrews (20) into cover assembly (18). Using a 5mm socket wrench attachment and torque wrench, torque the seven socket head capscrews (20) to 80 ± 5.0 in-lb (92 ± 6.0 cm-kg).

(5) *Follow-On Maintenance*. The feeder assembly is then replaced on the weapon, and the weapon is tested for performance.

c. *Repair Feed Shaft, Index Drive Assembly, and Wormshaft Assembly*. This task will cover disassembly, cleaning, inspection/repair, lubrication, and assembly of the feed shaft, index drive assembly, and wormshaft assembly.

(1) *Initial Setup*.

(a) *Applicable Configurations*. All.

(b) *Tools*. Small arms repairer tool kits.

(c) *Materials/Parts*. 0.032 inch diameter locking wire, grease, wiping rag, dry cleaning solvent, hex self-locking nut.

(d) *Personnel Required*. Small arms repairer and helper.

(e) *Equipment Conditions*. Feeder assembly and the following components are removed: rotor assembly, upper feed and lower feed sprockets, feeder standoff, stepped spacer, upper eject guide, rear upper link stripper, and rear lower link stripper.

(2) *Procedural Steps for Disassembly of the Feed Shaft, Index Drive Assembly, and Wormshaft Assembly*.

Step 1. Place feeder drive assembly (1) on its side with feed select solenoid (2) on top (see figure 19 on the following page).

Step 2. Using a 6mm hex key, remove two socket head capscrews (3) from rear plate assembly (4).

Step 3. Stand feeder drive assembly (1) on end with feeder handle (5) on top.

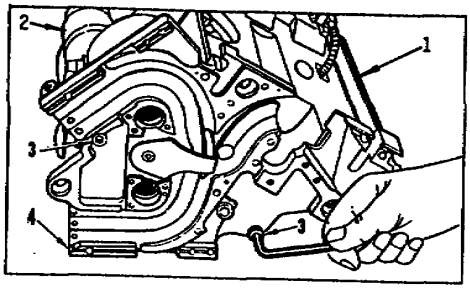
Step 4. Using a 5mm hex key, remove two socket head capscrews (6) from feeder drive assembly (1).

Step 5. Turn feeder drive assembly (1) so feeder handle (5) is positioned as shown in figure 19 on the following page.

Step 6. Using a 5mm hex key, remove four socket head capscrews (7)(see figure 20 on the following page) from rear plate assembly (4).

Step 7. Position feeder drive assembly on its side with feed select solenoid on top. Using helper to hold feeder drive assembly, pull rear plate assembly (4) from feeder drive assembly (1).

FIGURE 19. POSITIONING FEEDER DRIVE ASSEMBLY AND REMOVING SOCKET BEAD CAPSCREWS.



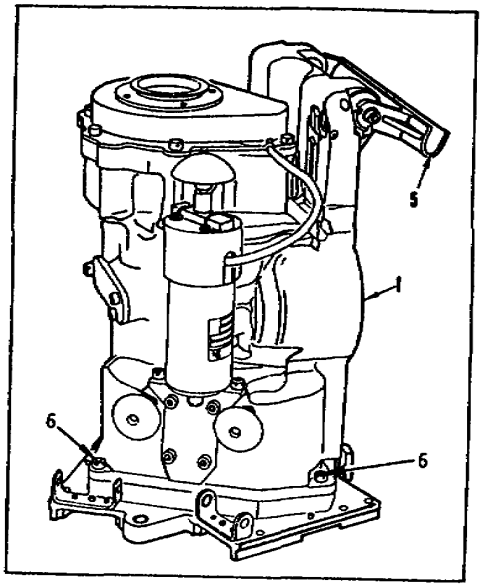
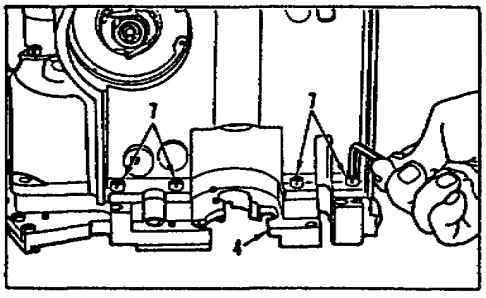
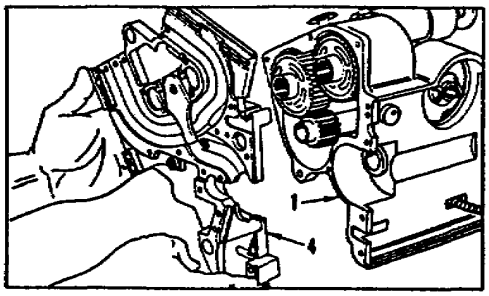


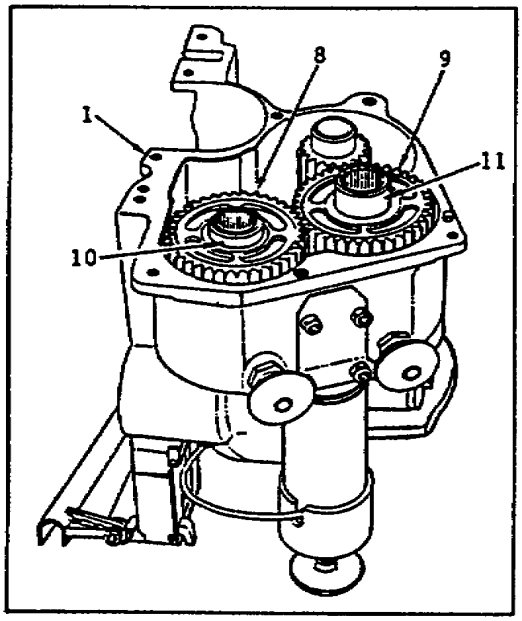
FIGURE 20. REMOVING SOCKET HEAD CAPSCREWS AND REAR PLATE ASSEMBLY.

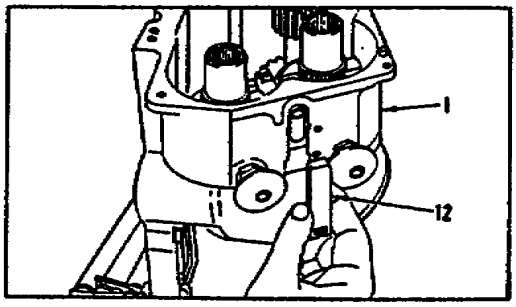


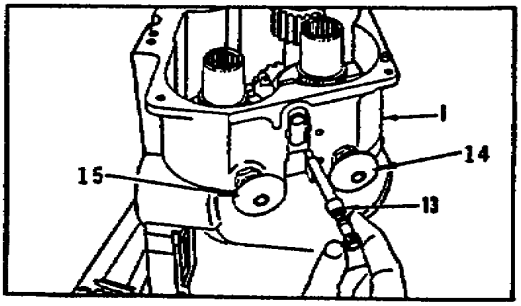


Step 8. Stand feeder drive assembly (1) on end, with cam spur gears (8, 9) on top. Using a helper to hold feeder drive assembly, pull the two cam spur gears (8, 9) from the shouldered lower and upper shafts (feed shafts)(10, 11)(figure 21).

FIGURE 21. REMOVING CAM SPUR GEARS, YOKE ACTUATOR, FORK SHAFT, AND FEED SHAFT STOP ASSEMBLIES.







Step 9. The feed select solenoid would then be removed as described in paragraph 2b(2) on page 26 of this task.

Step 10. Slide yoke actuator (12) out of feeder drive assembly (1)(see figure 21).

Step 11. Screw a 5mm capscrew into fork shaft (13) (figure 21 on the previous page) and then pull fork shaft (13) out of feeder drive assembly (1).

Step 12. Using a 19mm wrench, remove two feed shaft stop assemblies (14, 15) from feeder drive assembly (1).

NOTE

All assemblies must be removed at the same time. A helper would be used to hold feeder housing for next step. To facilitate removal of feed shafts, pull up slightly on gear clutch assembly.

Step 13. Grasp feed shafts (10, 11). Pull up and slightly to the side and remove feed shafts with clutch assemblies (16, 17) and clutch yoke assembly (18) (figure 22).

Step 14. Slide clutch assemblies (16, 17) and clutch yoke assembly (18) over the top of feed shafts (10, 11) as shown in figure 22.

Step 15. Remove upper and lower clutch assemblies (16, 17) from clutch yoke assembly (18) (see figure 22).

FIGURE 22. REMOVING CLUTCH YOKE, CLUTCH ASSEMBLIES, AND FEED SHAFTS.

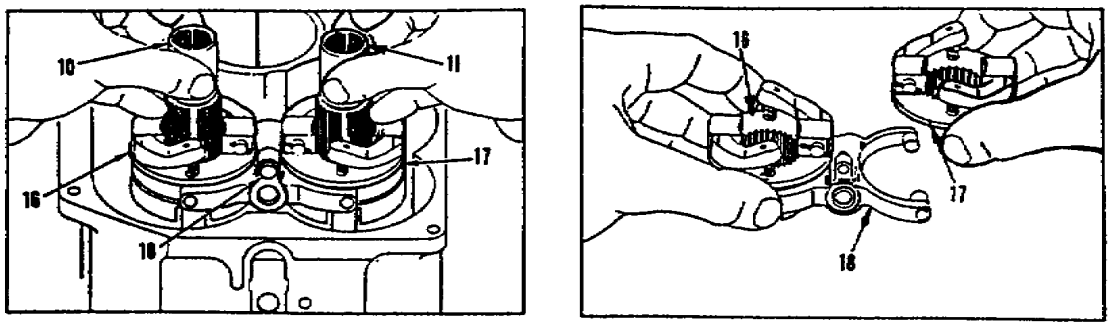
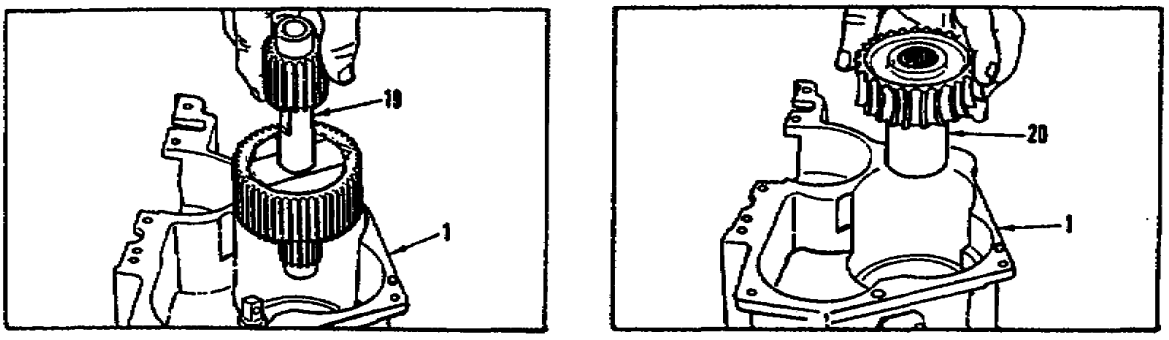


FIGURE 23. REMOVING GEAR CLUTCH ASSEMBLY AND WORM WHEEL GEAR.



Step 16. Pull gear clutch assembly (19)(figure 23) and worm wheel gear (20) out of feeder drive assembly (1).

Step 17. Place feeder drive assembly on its side. Using diagonal-cutting pliers and duckbill pliers, remove lockwire from socket head capscrew (21) (figure 24 on the following page) and wormshaft nut (22) and then, using a 5mm hex key, remove socket head capscrew (21) from wormshaft nut (22).

CAUTION

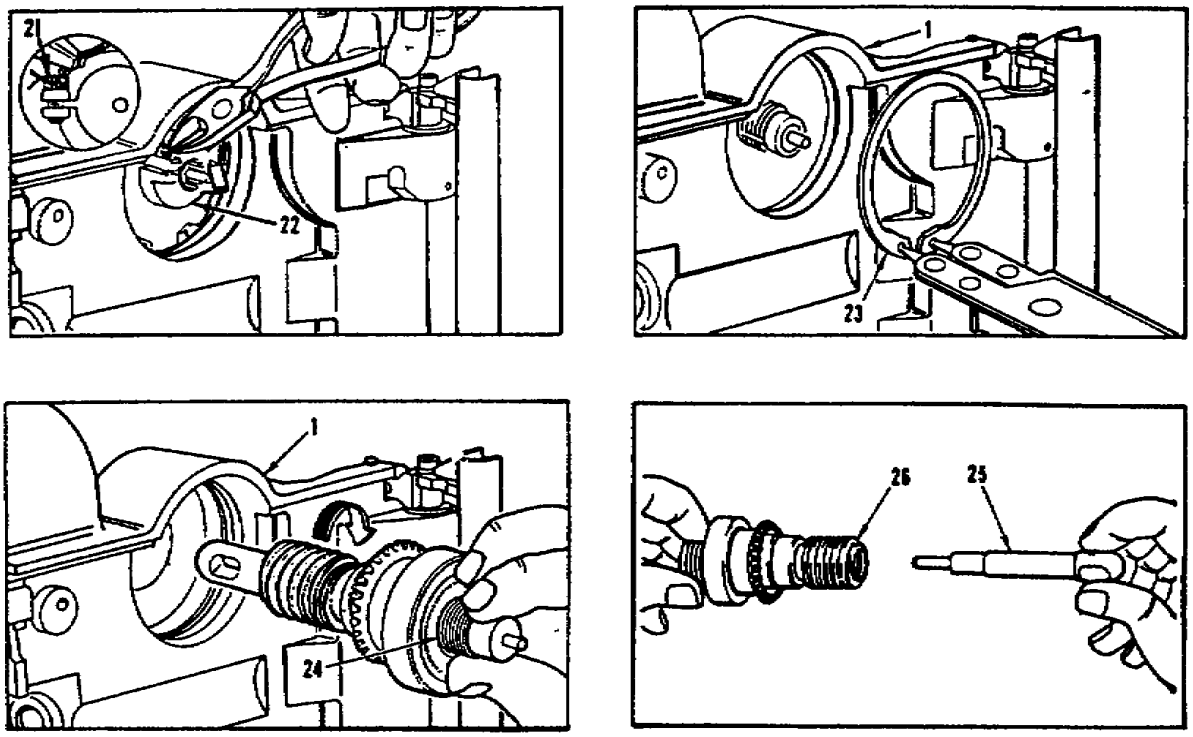
For step 18, do not strike split side of nut. Be sure to strike solid side.

NOTE

The wormshaft nut has left hand threads.

Step 18. Using a plastic-face hammer and a drift pin, tap the wormshaft nut (22) clockwise until loose, then remove.

FIGURE 24. REMOVING LOCKWIRE, WORMSHAFT NUT, AND WORMSHAFT ASSEMBLY.



WARNING

Eye protection should be worn when removing snap ring.

Step 19. Using retaining ring pliers, remove wormshaft retaining ring (23) from feeder drive assembly (1) (figure 24).

NOTE

If wormshaft cannot be removed, reinstall wormshaft nut and use it to turn shaft.

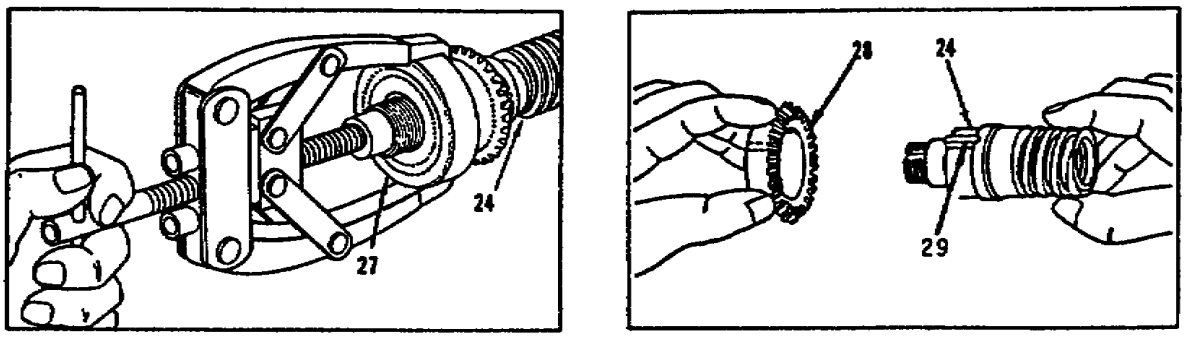
Step 20. Grasp wormshaft (24) and twist clockwise until the wormshaft assembly comes out of feeder drive assembly (1). Then, pull rod (25) out of wormshaft assembly (26).

NOTE

A mechanical puller may or may not be needed to perform the following step.

Step 21. Using an outside mechanical puller, remove ball bearing (27) from wormshaft (24)(figure 25).

FIGURE 25. DISASSEMBLING WORMSHAFT ASSEMBLY.



NOTE

If wormshaft gear sticks, tap it with a plastic-face hammer.

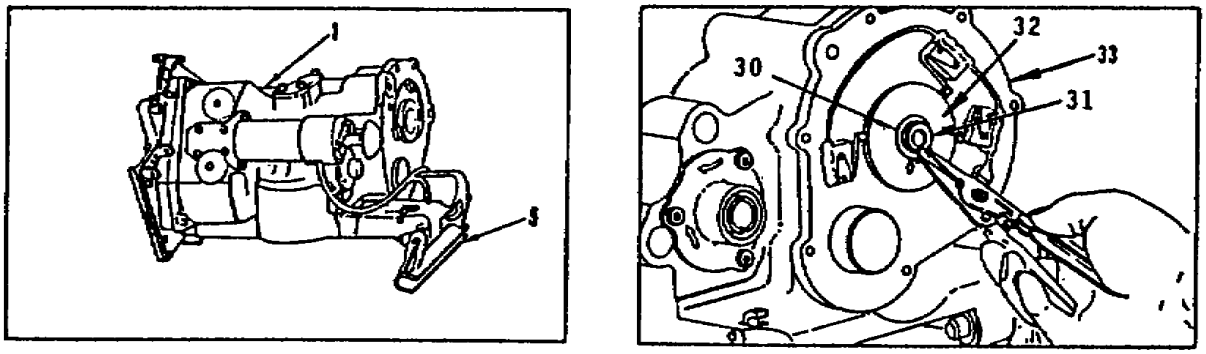
Step 22. Pull wormshaft gear (28) away from wormshaft (24) (see figure 25).

NOTE

Duckbill pliers may or may not be needed to perform the following step.

Step 23. Using duckbill pliers, pull machine key (29) from wormshaft (24).

FIGURE 26. REMOVING CONTROL CAM AND INDEX DRIVE COVER ASSEMBLY.



Step 24. Place feeder drive assembly (1) on a clean, flat surface with feeder handle (5) in down position (see figure 26).

Step 25. Using retaining ring pliers, remove retaining ring (30) from index drive shaft (31) (figure 26).

Step 26. Pull control cam (32) from index drive shaft (31) and then pull index drive cover assembly (33) from feeder drive assembly (1).

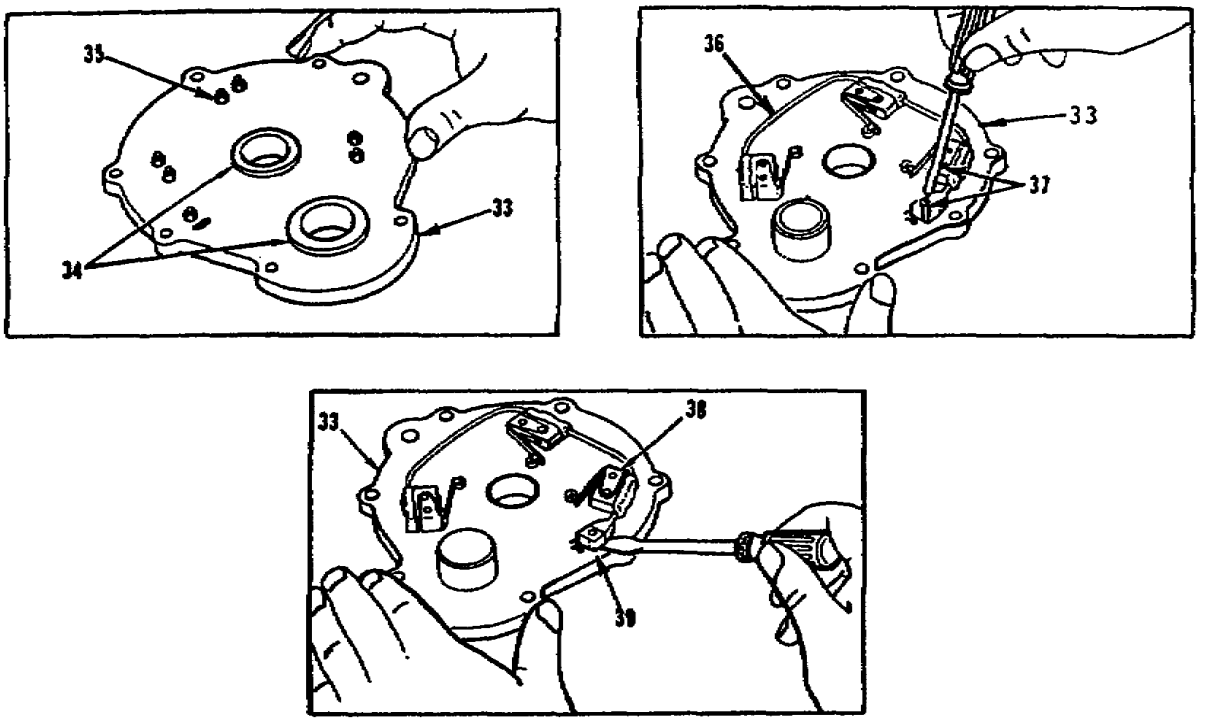
Step 27. Place index drive cover assembly (33) (figure 27 on the following page) on a flat surface with bushing flanges (34) and self-locking nuts (35) on top.

Step 28. Use a 1/8 inch box end wrench to remove seven self-locking nuts (35). Discard nuts.

Step 29. Turn index drive cover assembly (33) over with cable assembly (36) on top. Using a crosstip screwdriver, remove seven screws (37) from cable assembly (36).

Step 30. Using a flat-tip screwdriver, lift switch actuators (38) and cable assembly connector (39) from index drive cover assembly (33).

FIGURE 27. REMOVING CABLE ASSEMBLY.



Step 31. Remove cable assembly (36) from index drive cover assembly (33)(figure 27).

Step 32. Pull rotor stub (40) (figure 28 on the following page) and index drive shaft (31) at the same time from feeder drive assembly.

Step 33. Using diagonal-cutting pliers and duckbill pliers, remove lockwire from four socket head capscrews (41) that are securing can set (42).

Step 34. Place index drive into a vise that has protective jaw caps. Using a 5mm hex key, remove four socket head capscrews (41) that are securing cam set (42).

NOTE

If the can set is stuck on the index drive shaft, tap lightly with plastic face hammer to loosen.

Step 35. Grasp index drive shaft (31) (figure 28) and remove cam set (42) from index drive shaft.

Step 36. Using a 5mm hex key, remove three socket head capscrews (43) (figure 29) from timer cover assembly (44), then lift timer cover assembly (44) from feeder drive assembly (1).

FIGURE 28. REMOVING INDEX DRIVE SHAFT ASSEMBLY AND CAM SET.

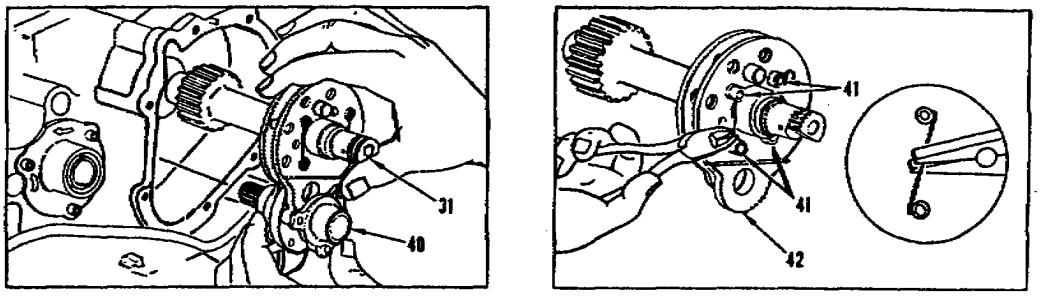
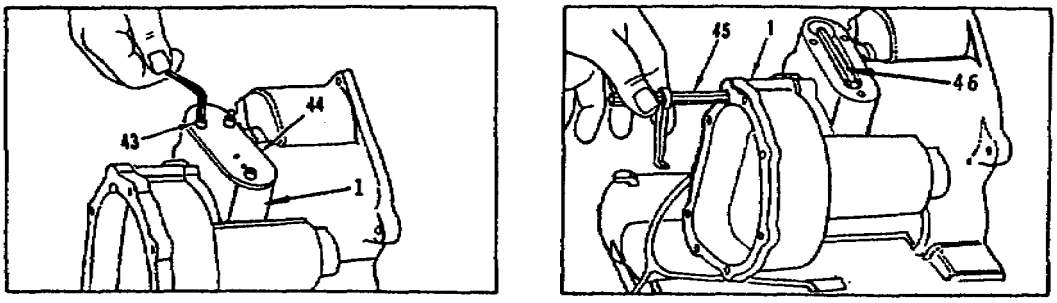


FIGURE 29. REMOVING TIMER COVER ASSEMBLY, TIMER SHAFT ASSEMBLY, AND TIMER LEVER.



Step 37. Pull timer shaft assembly (45) out of feeder drive assembly (1) and then lift timer lever (46) out of feeder drive assembly. (See figure 29 on the previous page.)

(3) *Procedural Steps for Cleaning the Feed Shaft, Index Drive Assembly, and Wormshaft Assembly* (see figure 30 on the following page).

WARNING

Dry cleaning solvent is flammable and should not be used near an open flame or in smoking areas. Use only in well-ventilated areas. This solvent evaporates quickly and has a drying effect on the skin. When used without gloves, it may cause cracks in the skin and in some cases mild irritation or inflammation.

CAUTION

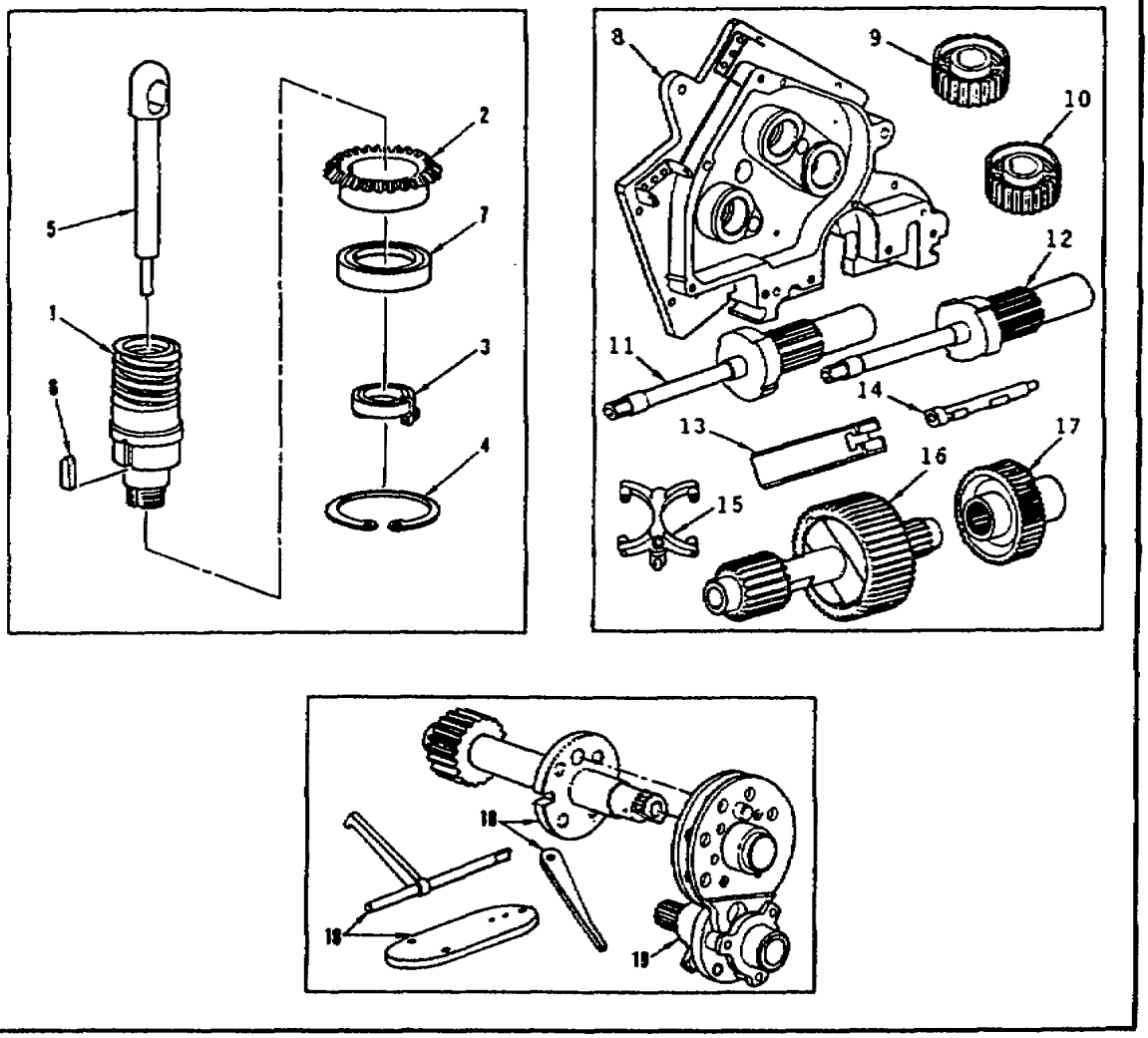
Do not clean bearing in solvent or allow solvent to run into bearing. Solvent will remain in bearing and dissolve lubricant, resulting in excessive wear or damage to bearing.

Step 1. Using solvent and a cleaning brush, clean wormshaft (1), wormshaft gear (2), wormshaft nut (3), retaining ring (4), rod (5), and machine key (6). Use a clean rag to wipe bearing (7) clean.

Step 2. Using a cleaning brush and solvent, clean rear plate assembly (8), cam spur gears (9, 10), feed shafts (11, 12), yoke actuator (13), fork shaft (14), clutch yoke assembly (15), gear clutch assembly (16), and worm wheel gear (17).

Step 3. Use a cleaning brush and solvent to clean index drive parts (18), except rotor stub (19). Use only a rag dampened with solvent to clean rotor stub (19) and then allow parts to air dry.

FIGURE 30. CLEANING WORMSHAFT ASSEMBLY PARTS, FEED SHAFT SECTION PARTS, AND INDEX DRIVE PARTS.



(4) *Procedural Steps for Inspection/Repair of the Feed Shaft, Index Drive Assembly, and Wormshaft Assembly.*

Step 1. Visually check wormshaft (1) and wormshaft gear (2) for wear, cracks, broken teeth, or stripped threads (see figure 30).

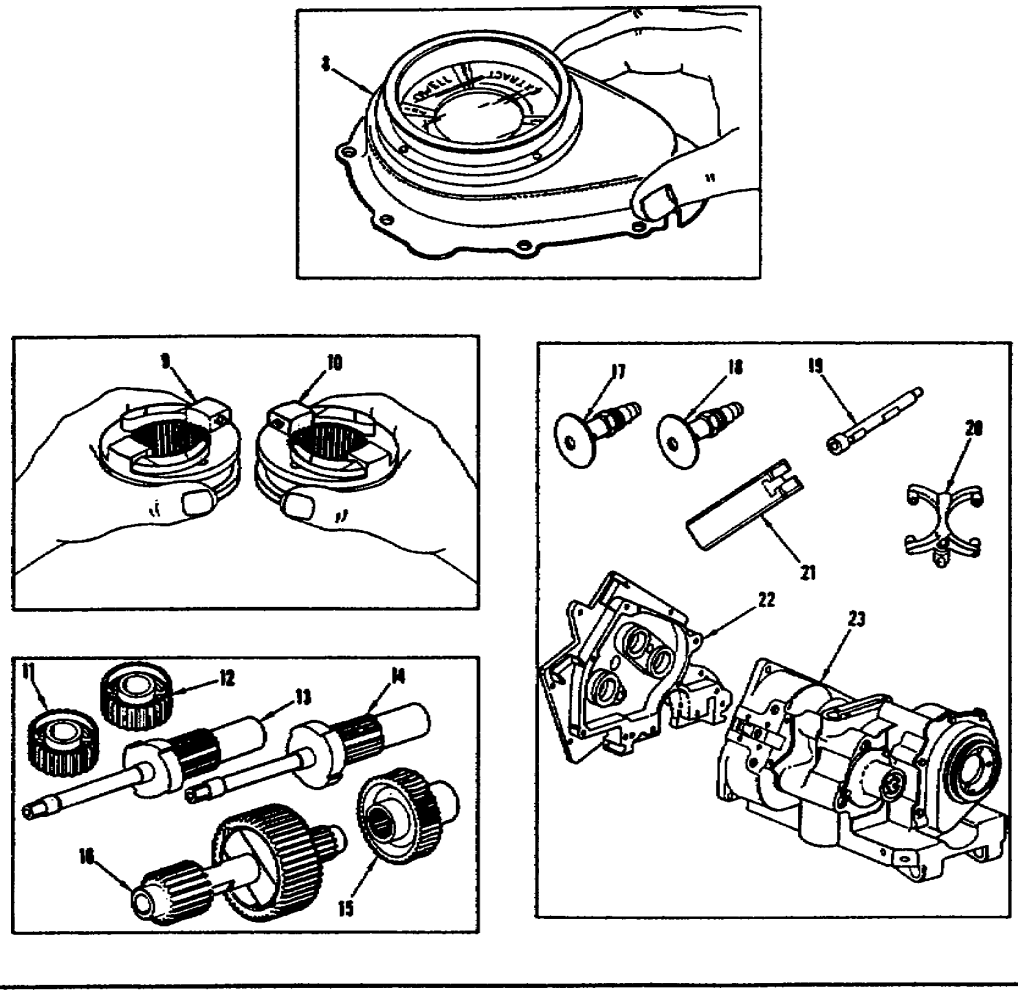
Step 2. Visually check wormshaft nut (3), retaining ring (4), rod (5), and machine key (6) for cracks or breaks.

Step 3. To check for binding or rough movement, hold ball bearing (7) by outer ring, rotate inner ring (see figure 30 on the previous page).

Step 4. The above parts would be replaced if any defects were found. The replacement part(s) would then be inspected by repeating steps 1, 2, and 3 described above.

Step 5. Visually inspect cover assembly (8) for cracks and breaks (see figure 31). A new cover would be obtained if the above conditions were found and the visual inspection would be repeated for the replacement cover.

FIGURE 31. INSPECTING COVER ASSEMBLY AND FEED SHAFT SECTION PARTS.



Step 6. Visually inspect upper and lower clutch assemblies (9, 10) for broken or missing springs, and cracked or chipped clutches (see figure 31 on the previous page). A new part would be obtained and visually inspected if any damage was found.

Step 7. Visually inspect cam spur gears (11, 12), feed shafts (13, 14), worm wheel gear (15), and gear clutch assembly (16) for broken gear teeth or splines. A new part would be acquired if any damage is found and the visual inspection would be repeated.

Step 8. Visually inspect feed shaft stop assemblies (17, 18) for broken springs and galls. Inspect fork shaft (19) and clutch yoke assembly (20) for galls or missing roller. Inspect actuator yoke (21) for galls, and rear plate assembly (22) for cracks and galls on bushings. Inspect housing (23) for chips, galls, cracks, etc. A new part would be obtained if any damage was found, and the visual inspection would be repeated.

Step 9. Visually inspect index drive cover assembly (24) (figure 32 on the following page) for stripped threads, missing nutplate (25), and damaged bushings (26). Get a new index drive cover assembly if above conditions are found. Repeat this step for any replacement index drive cover assembly.

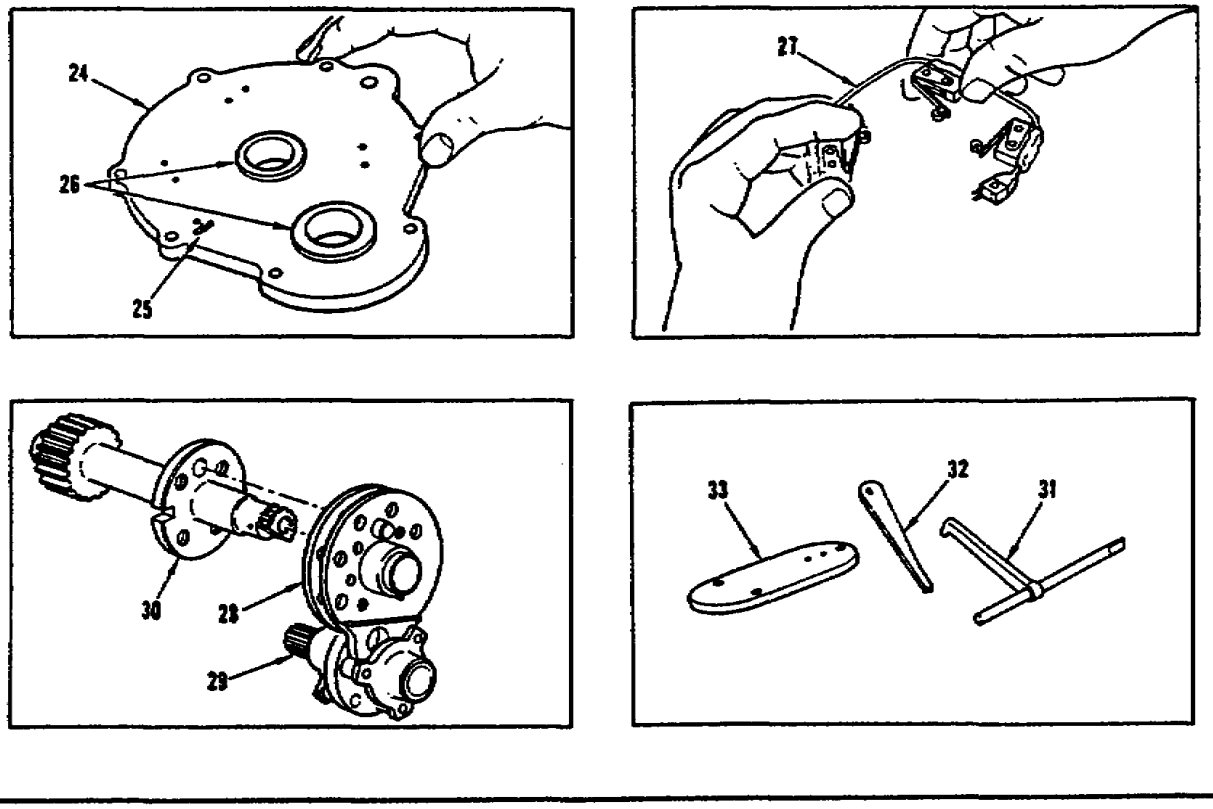
Step 10. Visually inspect cable assembly (27) for bent or broken switch arms, damaged connector and broken or frayed cable. A new cable assembly would be obtained if the above conditions were found and this step would be repeated for any replacement cable assembly.

Step 11. Visually check cam set (28), rotor stub (29), and index drive shaft (30) for broken teeth, physical damage, or damaged rollers.

NOTE

The rotor stub and cam set are a matched set. Replace as a matched set, if necessary.

FIGURE 32. INSPECTING INDEX DRIVE, CABLE, AND TIMER ASSEMBLIES.



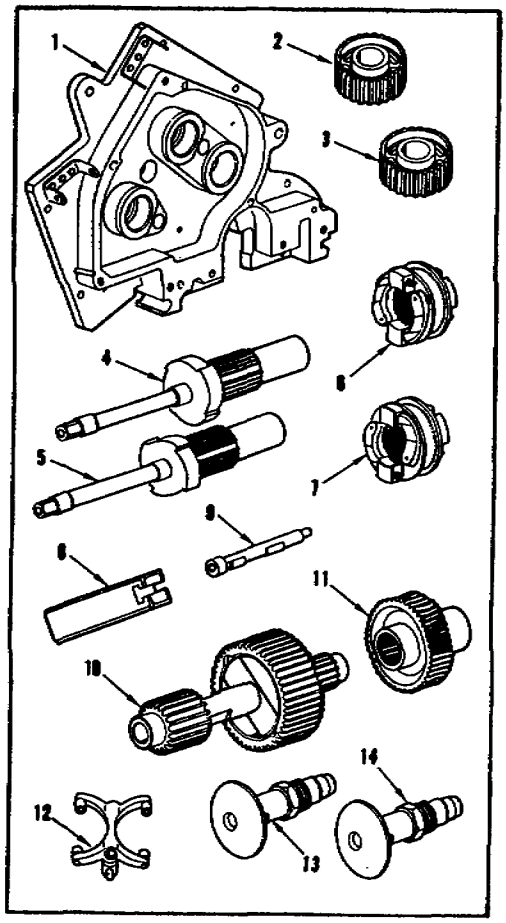
Step 12. Get a new index drive assembly or a new index drive shaft if the conditions in step 11 are found. Repeat step 11 for any replacement part.

Step 13. Visually inspect timer shaft assembly (31), timer lever (32), and timer cover assembly (33) for broken, bent, or missing parts (see figure 32). Get a new timer shaft assembly, timer lever or timer cover assembly if above conditions are found and repeat the visual inspection.

(5) *Procedural Steps for Lubrication of the Feed Shaft, Index Drive Assembly, and Wormshaft Assembly.*

Step 1. Using an acid brush, apply a light coat of grease to all parts except the retaining ring.

FIGURE 33. LUBRICATING FEED SHAFT SECTION PARTS.



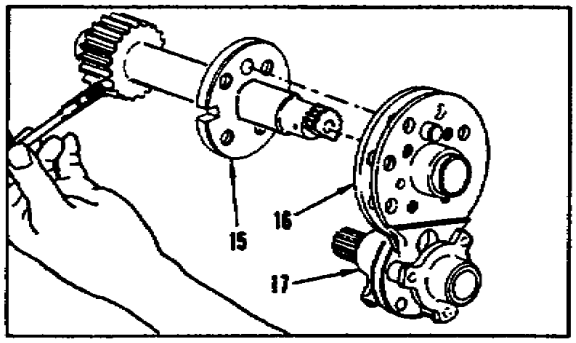
NOTE

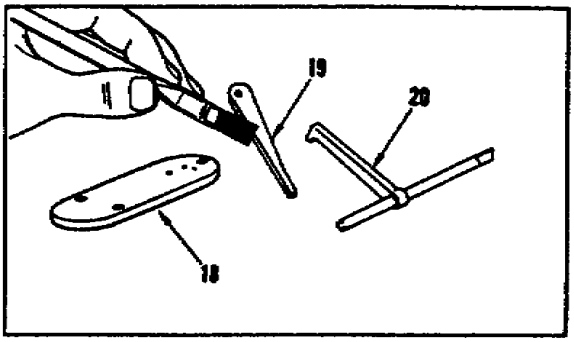
Do not apply grease to outside surface of rear plate assembly.

Step 2. Apply light coat of grease to all parts (1 thru 14) before assembling (see figure 33).

Step 3. Apply a light coat of grease to complete index drive shaft assembly surfaces (15, 16, and 17) (see figure 34 on the following page).

FIGURE 34. GREASING INDEX DRIVE AND TIMER ASSEMBLIES.





Step 4. Apply a light coat of grease to timer cover assembly (18), timer lever (19), and timer shaft assembly (20)(see figure 34).

(6) *Procedural Steps for Assembly of the Feed Shaft, Index Drive Assembly, and Wormshaft Assembly.*

Step 1. Place timer lever (1) into recess of feeder drive assembly (2)(see figure 35 on the following page).

Step 2. Push long end of timer shaft assembly (3) into hole (4) in rear of feeder drive assembly (2) and through timer lever (1).

Step 3. Place timer cover assembly (5) on feeder drive assembly (2). Using a 5mm socket attachment and torque wrench, install and torque three socket head capscrews (6) to 80 ± 5.0 in-lb (92 ± 6.0 cm-kg).

Step 4. Align collar (7) (figure 36 on the following page) on can set (8) with unthreaded hole (9) on index drive shaft (10).

NOTE

If needed, use plastic-face hammer to lightly tap cam set into position.

FIGURE 35. INSPECTING TIMER ASSEMBLIES.

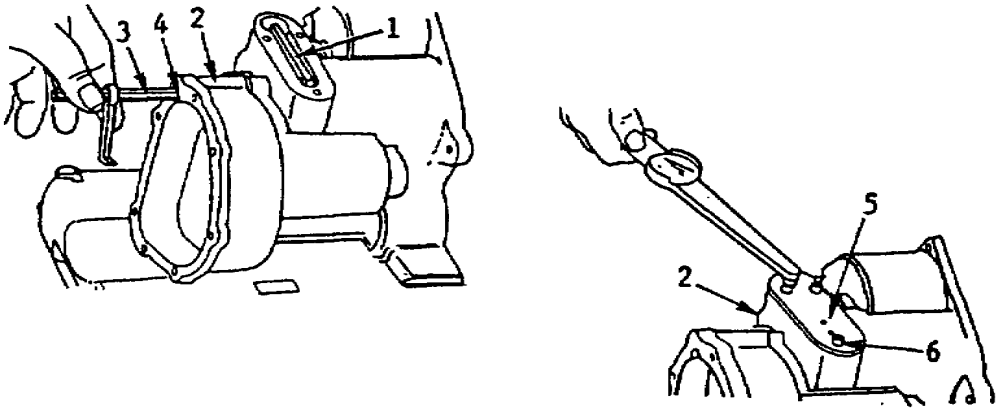
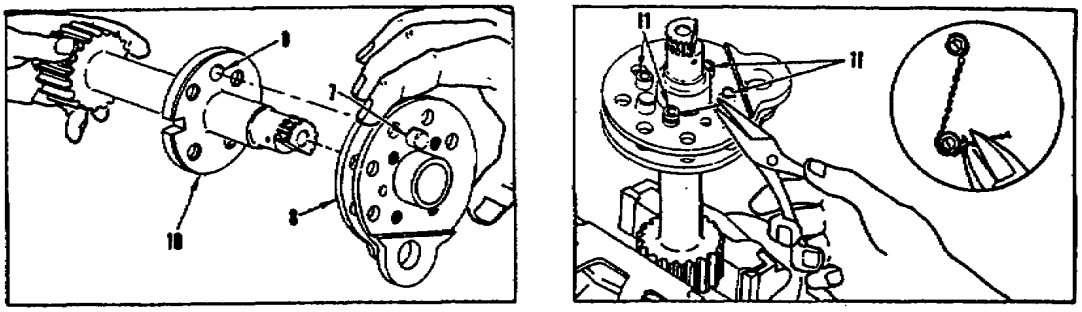


FIGURE 36. INSTALLING CAM SET.



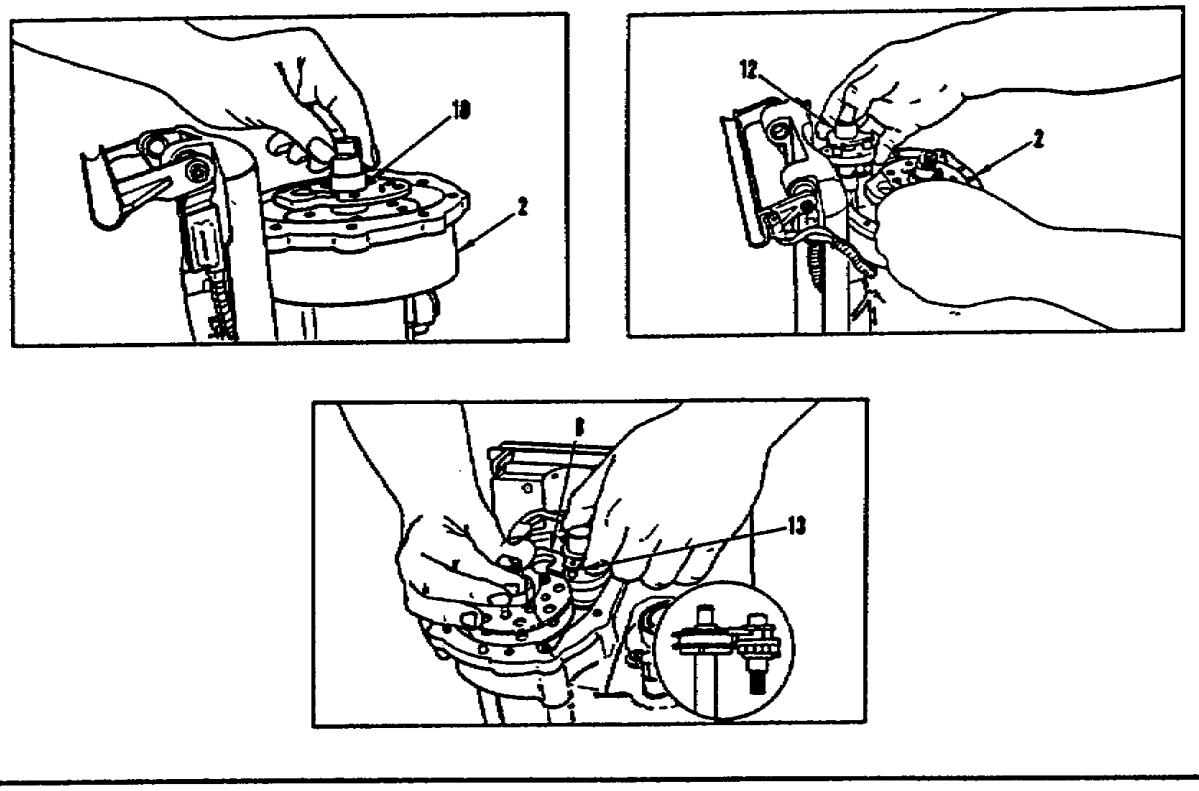
Step 5. Install cam set (8) on index drive shaft (10) until cam set is flush with index drive shaft and then place the index drive shaft in a vise that has protective jaw caps.

Step 6. Using a 5mm socket wrench attachment and torque wrench, torque four socket head capscrews (11) to 80 ± 5.0 in-lb (92 ± 6.0 cm-kg) (see figure 36).

Step 7. Lockwire socket head capscrews (11) in pairs using duckbill pliers, then remove excess lockwire using diagonal-cutting pliers.

Step 8. Place gear end of index drive shaft assembly (10)(figure 37) into feeder drive assembly (2) and continue installation of index drive shaft assembly (10) until top lip of index drive shaft is one inch above feeder drive assembly (2).

FIGURE 37. INSTALLING INDEX DRIVE SHAFT ASSEMBLY.



Step 9. Insert splined end of rotor stub (12) into feeder drive assembly (2). Mesh rotor stub flange (13) with index drive shaft assembly cam set (8) and slide into place. The assemblies should be kept meshed for the next step.

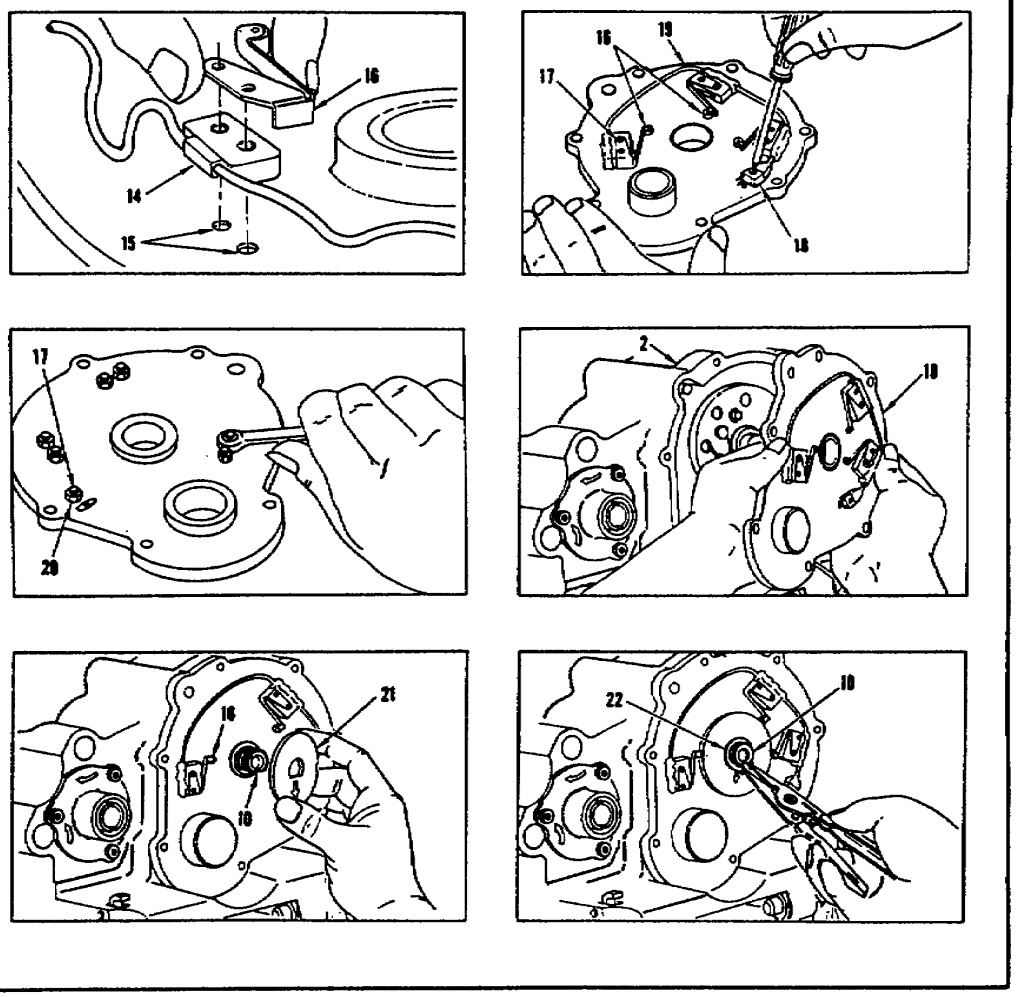
Step 10. Rotate cam set (8) slightly in both directions until it locks and falls into place (see figure 37).

Step 11. Position cable assembly switches (14) (figure 38) over holes (15) and position switch actuators (16) over switches (14).

NOTE

There are six pan head screws and one flat head screw. The flat head screw goes through the cable connector.

FIGURE 38. INSTALLING CABLE ASSEMBLY, INDEX DRIVE COVER ASSEMBLY, AND CONTROL CAM.



Step 12. Using a crosstip screwdriver, install seven screws (17) through the switch actuators (16) and cable connector (18) into index drive cover assembly (19). Using a 1/8 inch box end wrench, install seven new self-locking nuts (20) on screws (17) (see figure 38 on the previous page).

CAUTION

Do not move index drive parts in feeder drive assembly while installing index drive cover assembly. Retiming will be required if index drive parts are moved.

Step 13. Align index drive cover assembly (19) with feeder drive assembly (2) and install cover onto feeder drive assembly.

CAUTION

Do not bend switch actuators when installing control cam.

Step 14. Place control cam (21) on index drive shaft (10). Push away switch actuators (16) and slide the control cam (21) into place.

Step 15. Using retaining ring pliers, install retaining ring (22) into slot in index drive shaft (10).

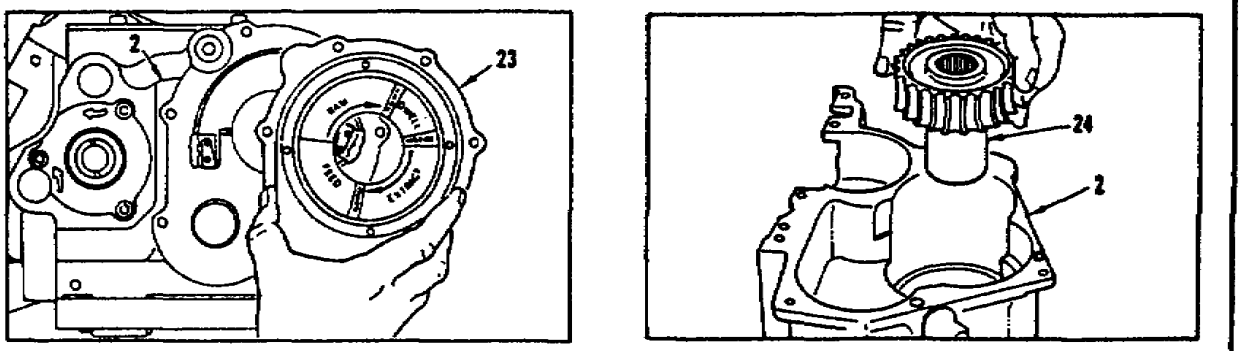
Step 16. Align cover assembly (23) (figure 39 on the following page) with holes in feeder drive assembly (2). Using a 5mm hex key, install two socket head capscrews (one in the bottom, one in the top of cover) in cover assembly (23).

NOTE

Do not torque cover assembly screws.

Step 17. Install worm wheel gear (24) into feeder drive assembly (2) (see figure 39 on the following page).

FIGURE 39. INSTALLING COVER ASSEMBLY AND WORM WHEEL GEAR.



NOTE

Duckbill pliers may or may not be needed for the next step.

Step 18. Using duckbill pliers, insert machine key (25) (figure 40 on the following page) into wormshaft (26). Align slot in wormshaft gear (27) with machine key (25) and install wormshaft gear, gear end first, on wormshaft (26). Then, place ball bearing (28) on wormshaft (26).

Step 19. If needed, use plastic-face hammer to tap ball bearing (28) until seated on wormshaft (26).

NOTE

Steps 20 and 21 are done at the same time.

Step 20. Place gear clutch assembly (29) (figure 41 on the following page) into feeder drive assembly (2), with long shaft on top.

NOTE

There are two sets of timing marks on larger gear on gear clutch assembly.

Step 21. Time gear clutch assembly by aligning three timing marks (30) as shown in figure 41.

FIGURE 40. ASSEMBLING WORMSHAFT ASSEMBLY.

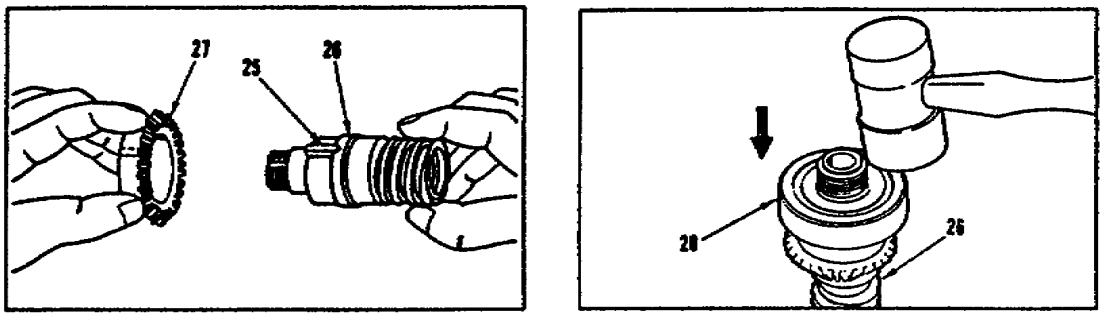
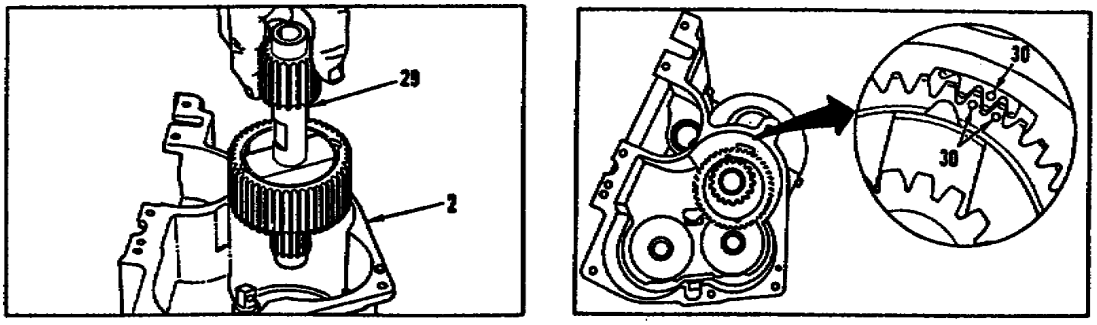


FIGURE 41. INSTALLING GEAR CLUTCH ASSEMBLY.

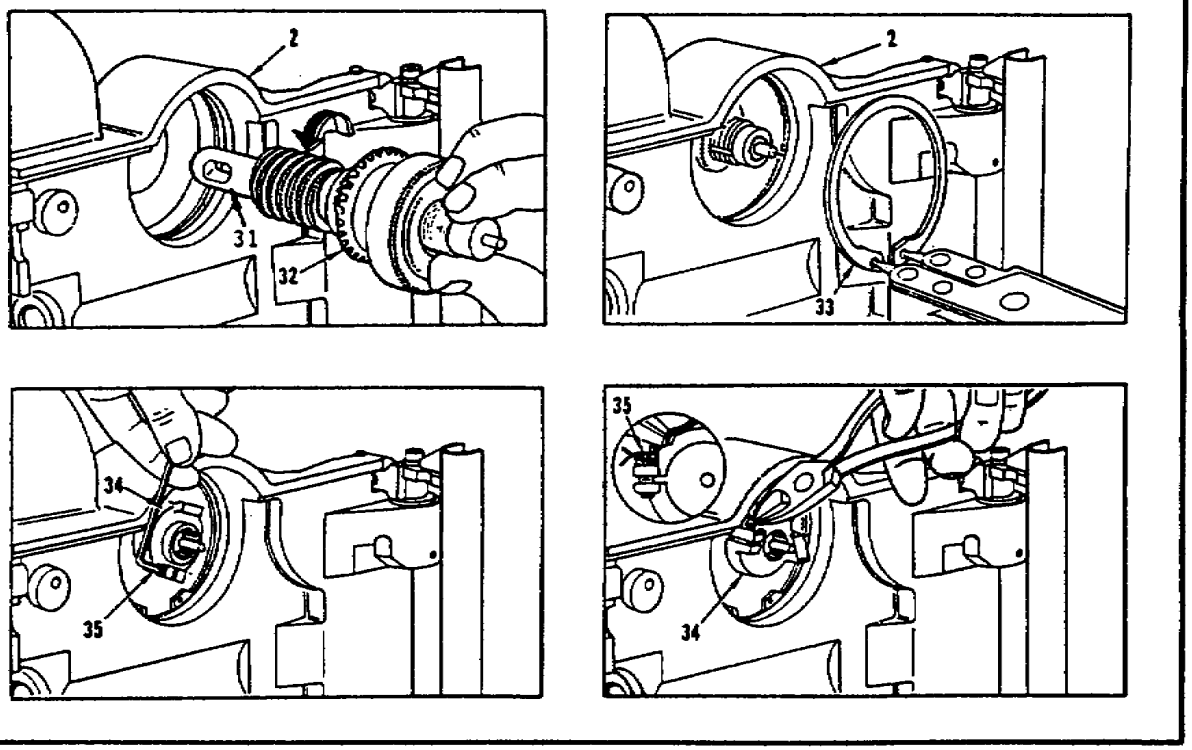


CAUTION

Timing marks must remain aligned through the installation of the rear plate assembly.

Step 22. Insert rod (31)(figure 42) into wormshaft assembly (32) and then place wormshaft assembly (32) into feeder drive assembly (2). Turn wormshaft assembly (32) counterclockwise until it stops.

FIGURE 42. INSTALLING WORMSHAFT ASSEMBLY, NUT, AND LOCKWIRE.



Step 23. Using retaining ring pliers, install retaining ring (33) inside feeder drive assembly (2).

NOTE

The wormshaft nut has left hand threads.

Step 24. Using a plastic-face hammer and drift pin, lightly tap wormshaft nut (34) twice on solid lug to bottom of shaft. Then, slightly rotate wormshaft nut (34) back and forth after the nut is tight (see figure 42 on the previous page). If unable to rotate nut (34), back off on nut and repeat step.

Step 25. Using a 5mm hex key, install socket head capscrew (35) that secures wormshaft nut (34). Then, using duckbill pliers, lockwire the socket head capscrew (35) to the wormshaft nut (34). Cut and remove excess lockwire.

Step 26. Place clutch yoke assembly (36) on work surface with pin (37) in the direction shown in figure 43 on the following page.

Step 27. Place lower clutch assembly (38) in left hand with dog legs (39) going in the same direction as the thumb.

Step 28. Place upper clutch assembly (40) in right hand with dog legs (41) going in the same direction as the thumb.

Step 29. Install lower and upper clutch assemblies into clutch yoke assembly.

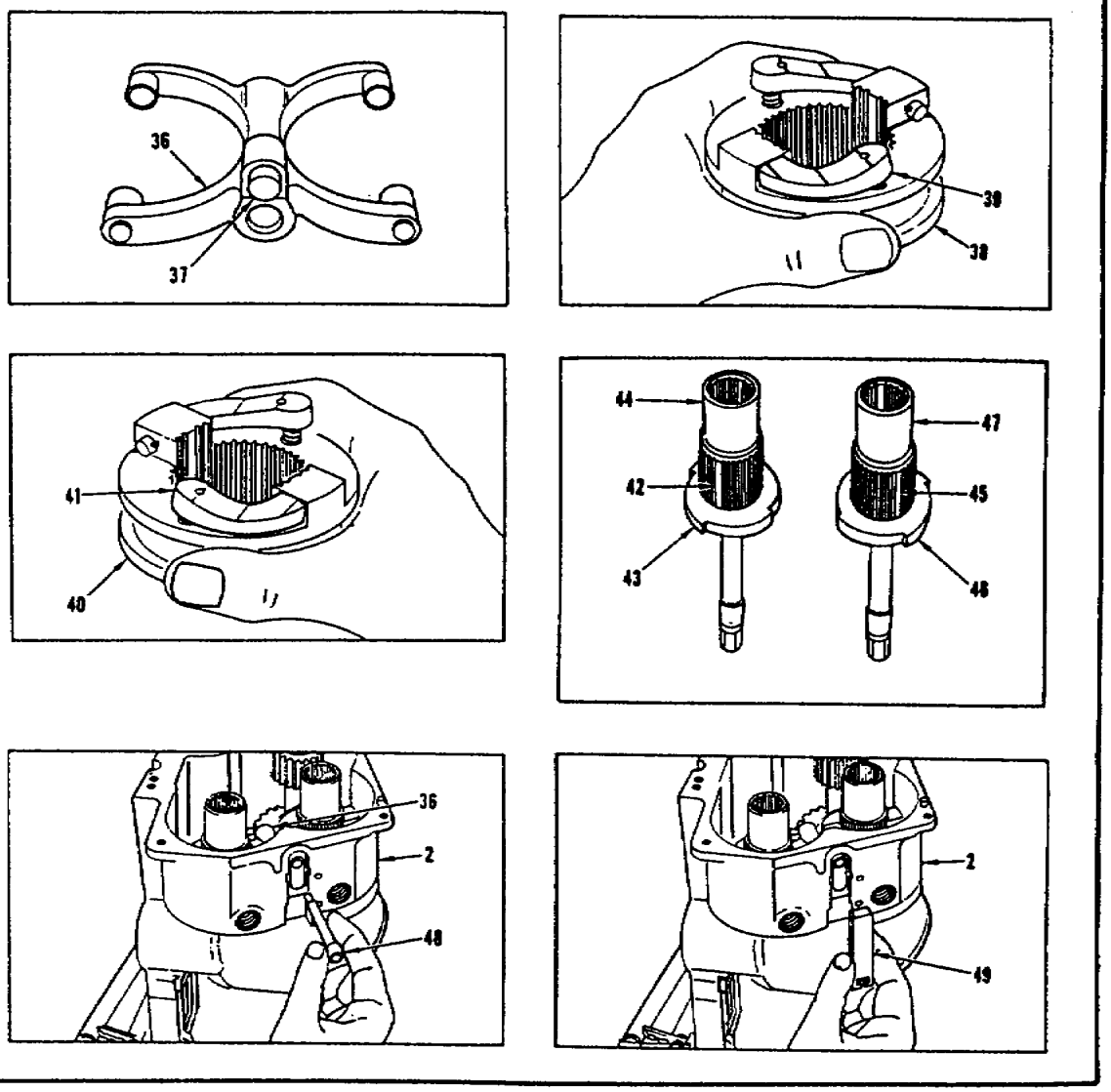
NOTE

The lugs on each feed shaft must be pointing in the same direction as the dogs on the clutch for that feed shaft. A helper should assist, as necessary, to perform the following step.

Step 30. Align keyed splines (42) with keyed splines inside clutch (38). Make sure lugs (43) are pointing in the same direction as dogs (39). Install shaft (44) into clutch (38).

Step 31. Align keyed splines (45) with keyed splines inside clutch (40). Make sure lugs (46) are pointing in the same direction as dogs (41). Install shaft (47) into clutch (40).

FIGURE 43. INSTALLING CLUTCH ASSEMBLIES AND FEED SHAFTS.



Step 32. Grasp the two feed shafts (44, 47). Install all components at the same time, making sure the actuator pin (37) is in the housing recess.

NOTE

If needed, raise gear clutch assembly for component clearance.

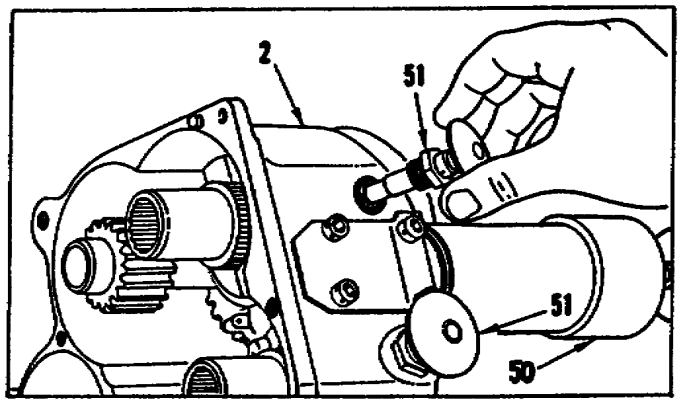
Step 33. Insert fork shaft (48) through feeder drive assembly (2) and into clutch yoke assembly (36) (see figure 43 on the previous page).

Step 34. Slide yoke actuator (49) in place on feeder drive assembly (2) (see figure 43).

Step 35. Install feed select solenoid as described in paragraph 2b(4) on page 29 of this task.

Step 36. Position feeder drive assembly (2) with feed select solenoid (50) positioned as shown in figure 44.

FIGURE 44. INSTALLING FEED SHAFT STOP ASSEMBLIES.

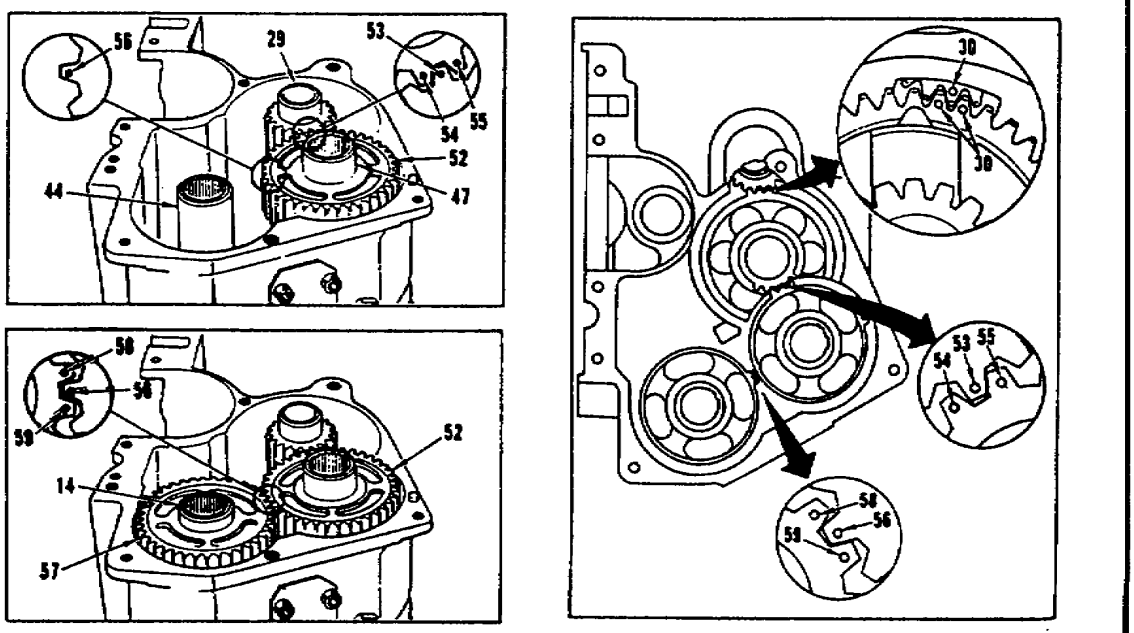


Step 37. Install two feed shaft stop assemblies (51) into feeder drive assembly (2). Using a 19mm wrench, tighten both feed shaft stop assemblies.

Step 38. Place upper feed shaft cam spur gear (52) (with two single timing marks) over feed shaft (47). Place one timing mark (53) between the two timing marks (54, 55) on the gear clutch assembly (29). Place the other timing mark (56) toward the lower feed shaft (44) as shown in figure 45 on the following page.

Step 39. Place lower feed shaft cam spur gear (57) over feed shaft (44) so that the single timing mark (56) on the upper feed shaft can spur gear (52) is between the two timing marks (58, 59) on the lower feed shaft cam spur gear (57).

FIGURE 45. INSTALLING CAM SPUR GEARS.



Step 40. Make sure both cam spur gears (52, 67) are fully seated. Check all timing marks for correct alignment, as shown in figure 45.

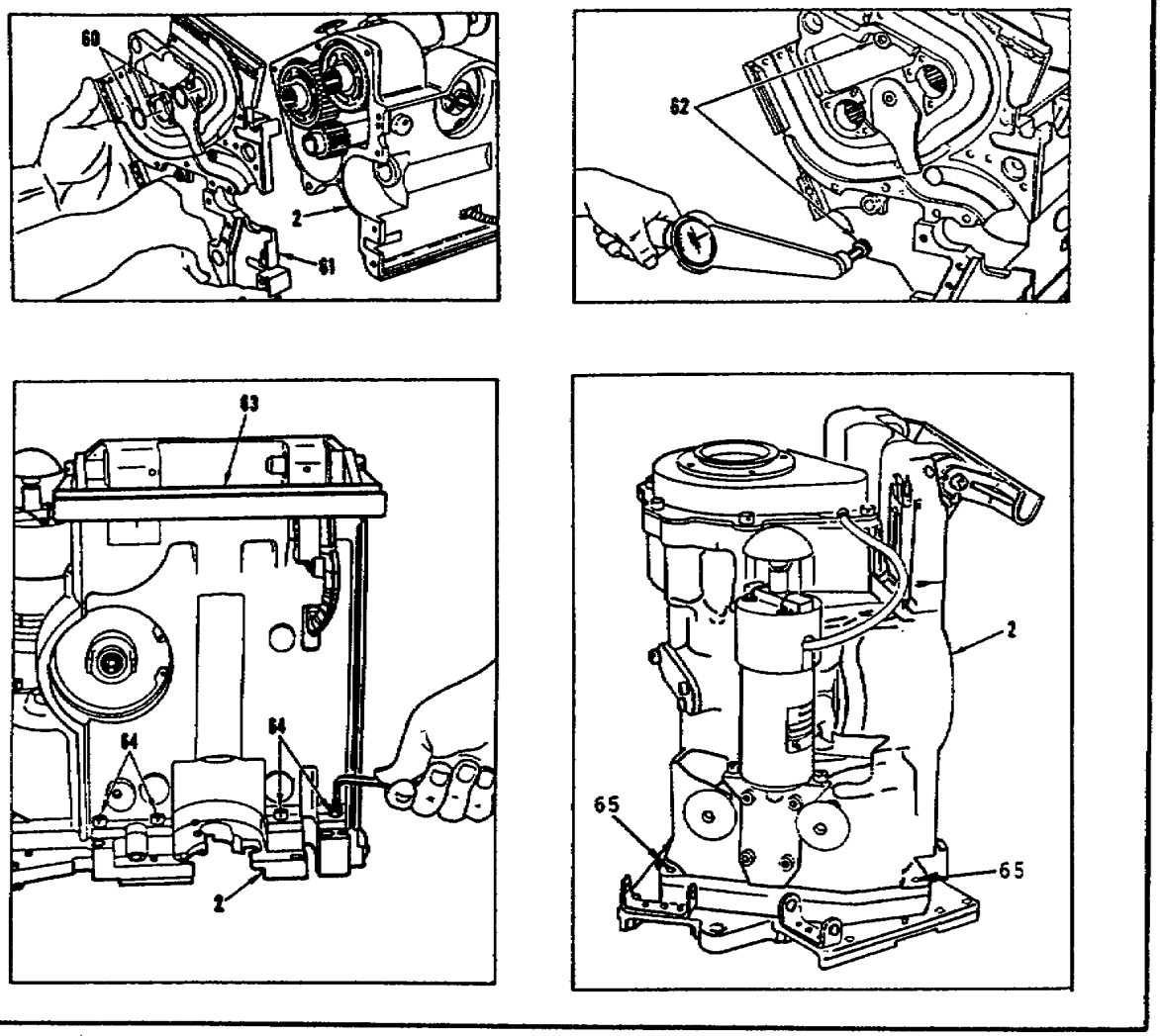
Step 41. Check that packings (60) (figure 46 on the following page) have not been removed from rear plate assembly (61). Replace packings (60) if they were removed.

Step 42. Align rear plate assembly (61) with feeder drive assembly (2) and gear shafts. Then, push rear plate assembly (61) firmly toward feeder drive assembly (2).

Step 43. Use a 6mm socket wrench attachment and torque wrench. Torque socket head capscrews (62) to 160 ± 10 in-lb (184 ± 12 cm-kg).

Step 44. Stand feeder drive assembly (2) on end with feeder handle (63) on top. Using a 5mm hex key, tighten four socket head capscrews (64). Turn feeder drive assembly (2) and use a 5mm hex key to tighten two socket head capscrews (65) (see figure 46).

FIGURE 46. INSTALLING REAR PLATE ASSEMBLY AND SOCKET READ CAPSCREWS.



Step 45. To adjust microswitches, remove cover assembly as described in step 2 of paragraph 2b(2) on page 27 of this task.

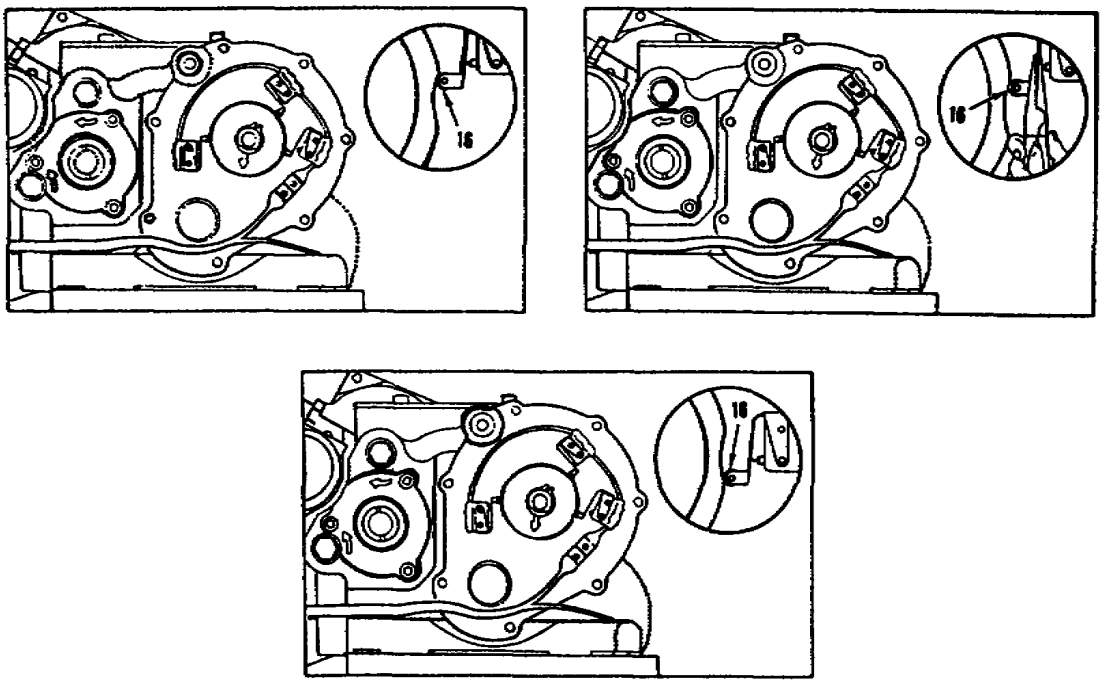
NOTE

Steps 46, 47, and 48 must be completed for each microswitch.

Step 46. Cycle drive assembly until the switch actuator arm roller (16) reaches the cutout on the cam as shown in figure 47. At this point you should hear an audible click from the microswitch. If there is an audible click, do not perform step 47. Go to step 48.

Step 47. If there is no audible click in step 46, use needle nose pliers to adjust the actuator arm. Bend the arm slightly near the roller to get the audible click noted in step 46.

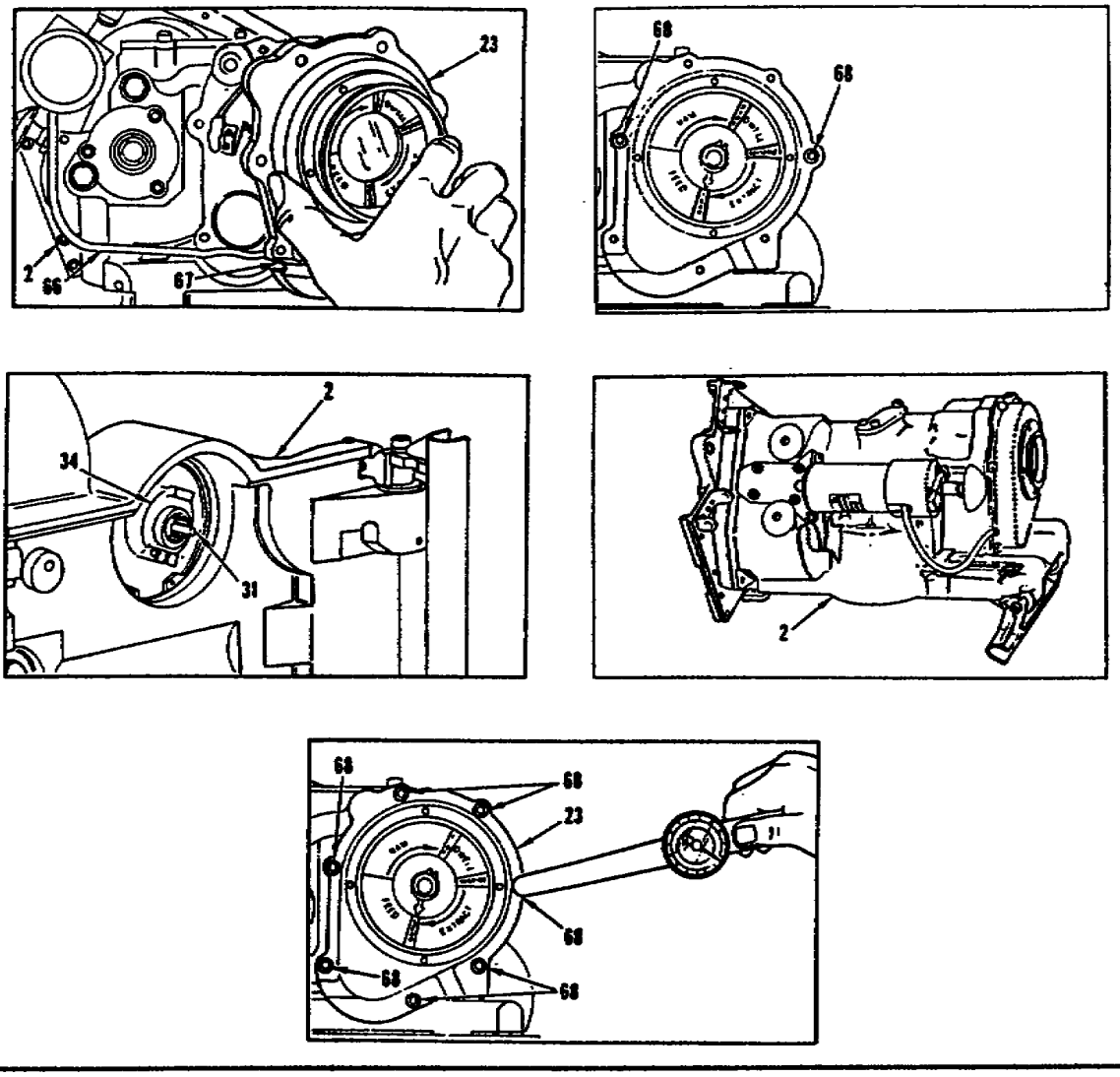
FIGURE 47. ADJUSTING MICROSWITCH ACTUATOR ARM.



Step 48. Cycle the drive assembly until the actuator arm roller (16) reaches the other side of the cam cutout (see figure 47). At this point, the actuator arm resets the microswitch and an audible click is heard. Repeat step 47 if no click is heard.

Step 49. Align cover assembly (23) with feeder drive assembly (2) so that solenoid cable (66) fits into the cutout (67) of the cover as shown in figure 48 of the following page.

FIGURE 48. INSTALLING COVER ASSEMBLY.



Step 50. Use a 5mm socket wrench attachment, install two opposing socket head capscrews (68), tighten until snug, and then back off 1/4 to 1/2 turn (see figure 48).

Step 51. Position feeder assembly on its side and rotate wormshaft nut (34) (figure 48) counterclockwise until feeder assembly (2) locks in sear position. Trip feeder assembly out of sear by pressing in rod (31) and turning wormshaft nut (34) counterclockwise two complete turns. Feel for binding as wormshaft nut (34) is turned.

(a) If no binding is found, repeat step 51 in its entirety to ensure that no binding occurs (see figure 48 on the previous page).

(b) If binding occurs, slightly shift the position of the cover assembly (23) by repositioning with hand. Repeat step 50 as required until the binding has either been removed or reduced as much as possible.

Step 52. Position feeder assembly (2) as shown. Snug down the two installed socket head capscrews (68) and install and snug down the remaining five socket head capscrews (68) into cover assembly (23).

Step 53. Use a 5mm socket wrench attachment and torque wrench, and torque seven socket head capscrews (68) to 80 ± 5.0 in-lb (92 ± 60 cm-kg).

(7) *Follow-On Maintenance*. The follow-on maintenance for this repair procedure would be to install: rotor assembly, upper feed and lower feed sprockets, feeder standoff, stepped spacer, upper eject guide, rear upper link stripper, and rear lower link stripper. The mechanic would then check the feeder cycle manually for proper operation.

d. Repair Gear Clutch Assembly. This task will cover the disassembly, cleaning, inspection/repair, lubrication, assembly, and testing of the gear clutch assembly.

(1) *Initial Setup*.

(a) *Applicable Configurations*. All.

(b) *Tools*. Small arms repairer tool kits, gear clutch tool.

(c) *Materials/Parts*. Grease and dry cleaning solvent.

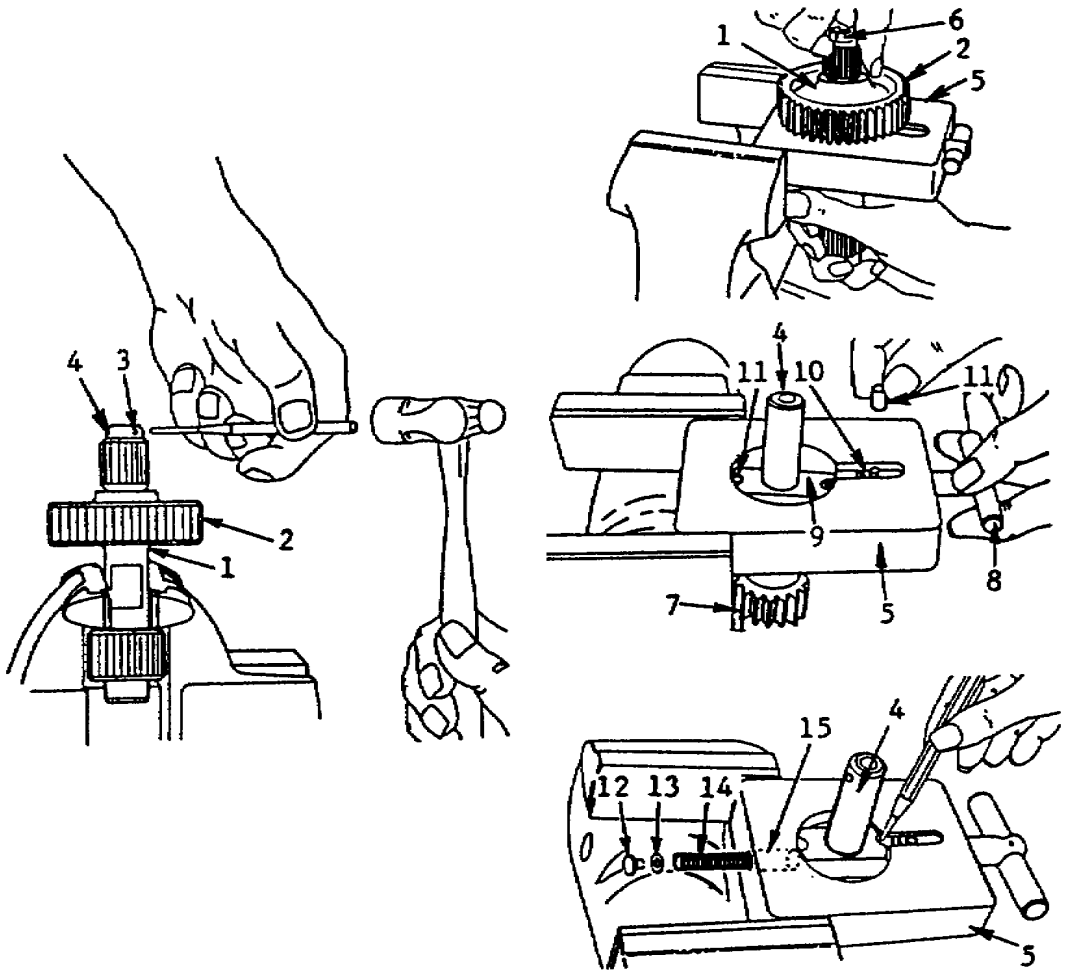
(d) *Personnel Required*. Small arms repairer and helper.

(e) *Equipment Conditions*. Gear clutch assembly removed.

(2) *Procedural Steps for Disassembly of the Gear Clutch Assembly.*

Step 1. Place gear clutch assembly (1) (figure 49) into a vise with protective jaw caps, so that the clutch spur gear (2) up.

FIGURE 49. REMOVING CLUTCH SPUR GEAR.



Step 2. Use a 3/16 inch drive pin punch and ball peen hammer to remove headless straight pin (3) from spur gear shaft (4), then remove assembly from vise.

WARNING

Spur gear rollers and rivets contained under clutch spur gear are under spring pressure. Wear eye protection and remove rollers only when rollers are expanded into the two troughs under clutch spur gear. Eye injury may result if allowed to shoot out from clutch spur gear. Medical help should be sought immediately if eye is injured.

Step 3. Place gear clutch assembly tool (5) in vise, then place gear clutch assembly (1) in assembly tool (5) with the clutch spur gear (2) on top. Rotate gear clutch assembly (1) until pin hole (6) is 90 degrees across tool.

NOTE

Do not lift clutch spur gear during step 4.

Step 4. Grasp small spur gear (7) and pull down with force until a snap is heard (see figure 49 on the previous page).

Step 5. Now, lift clutch spur gear (2) from spur gear shaft (4).

Step 6. Pull out on handle (8) of tool (5). Turn small spur gear (7) until lugs (9) are in line with shaft (10).

Step 7. Remove roller (11) from shaft (10) if rollers are still in slots. Using punch, push and remove rivet (12), washer (13), and spring (14) from hole (15). Remove spur gear shaft (4) from tool (5).

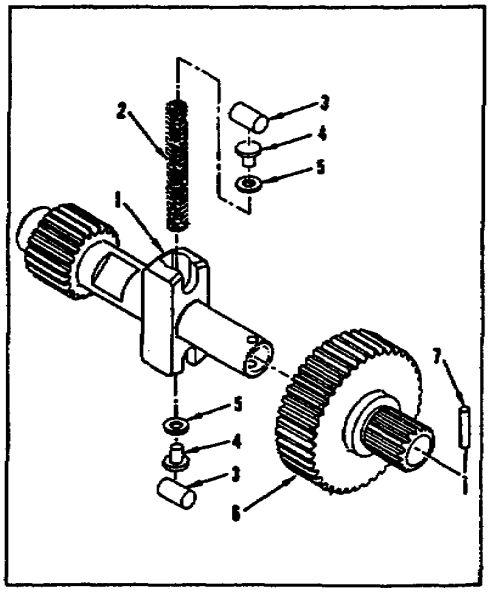
(3) Procedural Steps for Cleaning the Gear Clutch Assembly.

WARNING

Dry cleaning solvent is flammable and should not be used near an open flame or in smoking areas. Use only in well-ventilated areas. This solvent evaporates quickly and has a drying effect on the skin. When used without gloves, it may cause cracks in the skin and in some cases mild irritation or inflammation.

Step 1. Use a cleaning brush and dry cleaning solvent to clean all gear clutch assembly parts (1 thru 7) (see figure 50).

FIGURE 50. CLEANING, INSPECTING, AND LUBRICATING GEAR CLUTCH ASSEMBLY PARTS.



(4) *Procedural Steps for Inspection/Repair of the Gear Clutch Assembly.*

Step 1. Visually inspect gear clutch assembly parts (1 thru 7) for cracks, chips, breaks, or missing parts (see figure 50 on the previous page). Get new parts, if above conditions are found, and repeat the visual inspection for any replacement parts.

Step 2. Using a steel rule, check square wire compression spring (2) for free length of 2 1/2 ± 1/32 inches (63.5 ± 0.8mm). Get a new spring if free length is incorrect and repeat above check.

(5) *Procedural Steps for Lubrication of the Gear Clutch Assembly.*

Step 1. Apply a light coat of grease, using an acid brush, to all parts (1 thru 7) (see figure 50).

(6) *Procedural Steps for Assembly of the Gear Clutch Assembly.*

Step 1. Slide a washer (1) on each rivet (2) and install a washer/rivet set at both ends of spring (3). Place gear clutch assembly tool (4) in vise as shown in figure 51 on the following page.

Step 2. Place spur gear shaft (5) in tool with lugs (6) aligned with hole (7) as shown in figure 51.

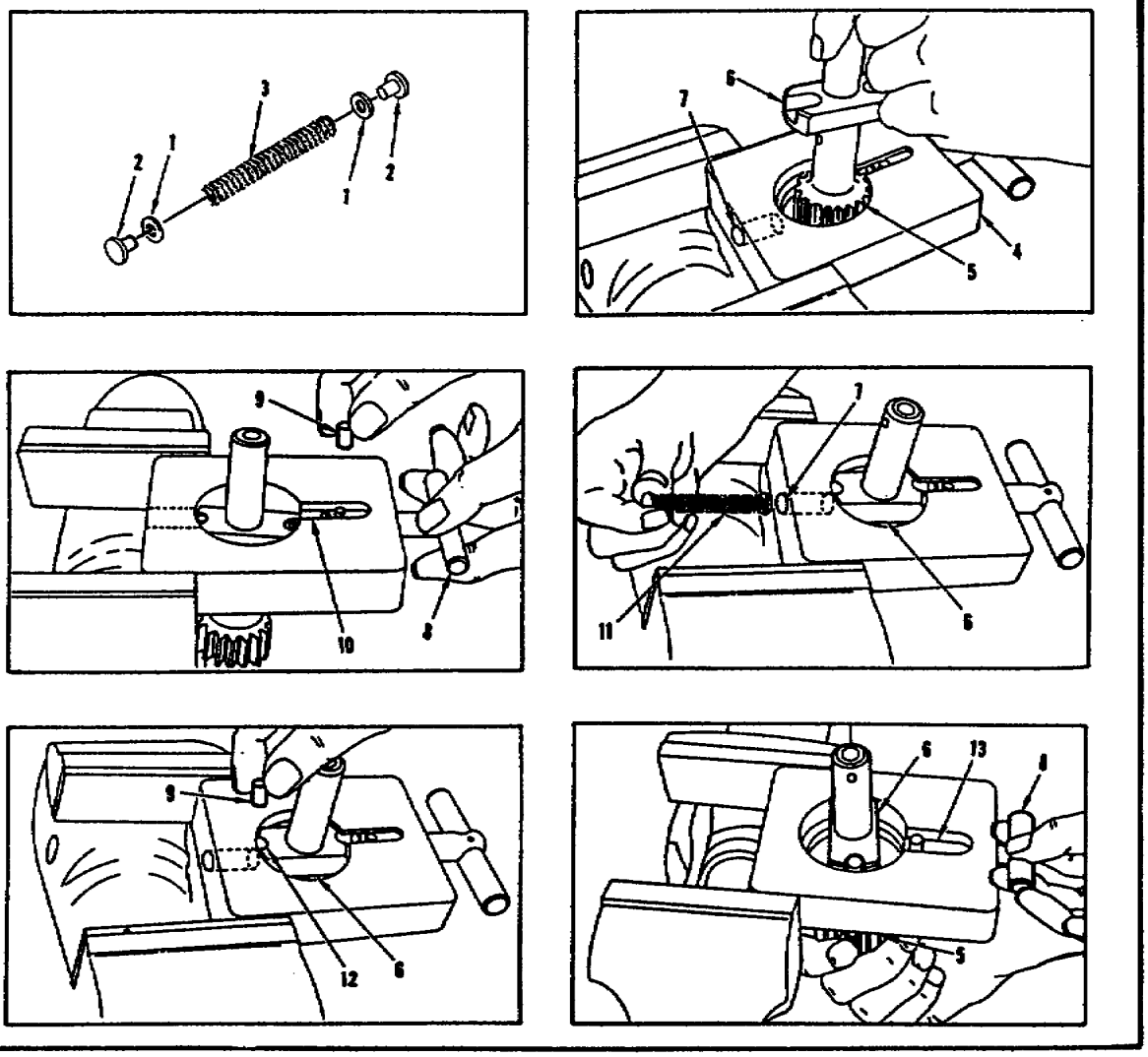
Step 3. Pull out on tool handle (8) and place roller (9) in slot (10) next to handle. Slide washer/rivet/spring set (11) into hole (7) in tool as shown in figure 51.

Step 4. Using punch, push washer/rivet/spring set (11) all the way into spur gear shaft lugs (6). Install roller (9) into slot (12) in spur gear shaft lug (6).

NOTE

A helper may be needed to turn gear in the next step.

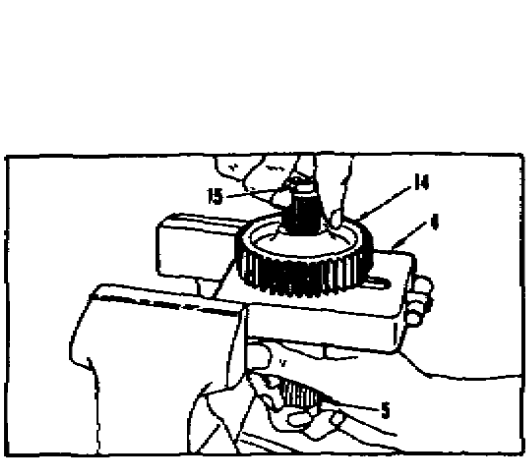
FIGURE 51. ASSEMBLING GEAR CLUTCH PARTS.

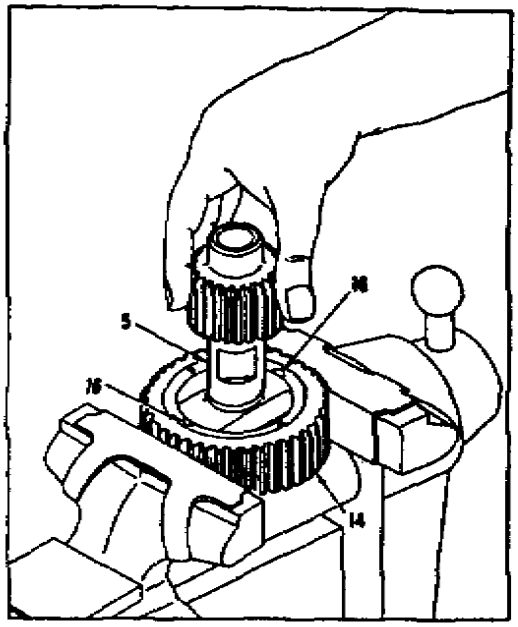


Step 5. Push in tool handle (8) and hold in place. Grasp gear end of spur gear shaft (6) and turn until lugs (6) are 90 degrees from tool handle shaft (13).

Step 6. Install clutch spur gear (14) on spur gear shaft (5) until bottom of clutch spur gear (14) is flush with top of tool (4) (see figure 52 on the following page).

FIGURE 52. ASSEMBLING GEAR CLUTCH PARTS (CONTINUED).



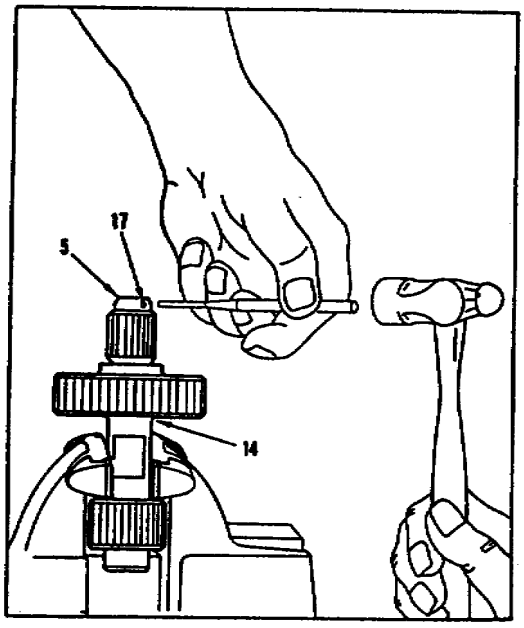


Step 7. Hold clutch spur gear (14) flush with tool. (4). Push up on gear end of spur gear shaft (5) until hole (15), in end of spur gear shaft (6), is above the spline on the clutch spur gear (14). Carefully lift gear clutch assembly straight up out of tool.

Step 8. Place gear clutch assembly into a vise that has protective jaw caps, with spur gear shaft (5) up. Turn spur gear shaft (5) with force until rollers snap into notches (16) in wall of clutch spur gear (14).

Step 9. Place gear clutch assembly in vise with clutch spur gear (14) up. Ensure that vise has protective jaw caps. Use 3/16 inch drive pin punch and ball peen hammer to install headless straight pin (17) into spur gear shaft (5) (see figure 53 on the following page).

FIGURE 53. INSTALLING HEADLESS STRAIGHT PIN.



(6) *Procedural Steps for Testing the Gear Clutch Assembly.*

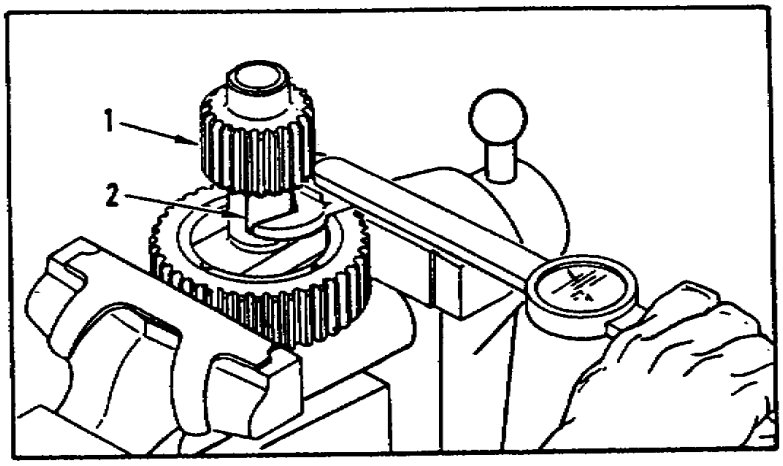
Step 1. Place gear clutch assembly in vise, with spur gear shaft (1) up as shown in figure 54 on the following page.

Step 2. Using a 22mm crowfoot and torque wrench, place crowfoot on flats (2) and turn spur gear shaft (1) at flats (2). When spur gear shaft (1) begins to slip from detent position, check that torque measurement is 500 ± 20 in-lb (575 ± 23 cm-kg). Get a new square wire compression spring if torque measurement is not within tolerance.

Step 3. Remove gear clutch assembly from vise.

(7) *Fellow-On Maintenance.* The follow-on maintenance for this procedure would be to install the gear clutch assembly as described in steps 20 and 21 of paragraph 2c(6) on pages 54 and 55.

FIGURE 54. TORQUING TEST GEAR CLUTCH ASSEMBLY.



e. *Repair Forward Feed Assembly.* This task will cover the disassembly, inspection/repair, and assembly of the forward feed assembly.

(1) *Initial Setup.*

(a) *Applicable Configurations.* All.

(b) *Tools.* Small arms repairer tool kits, bushing driver set.

(c) *Materials/Parts.* Block of wood approximately 1/2 by 2 by 6 (2 each), flanged bushing.

(d) *Personnel Required.* Small arms repairer.

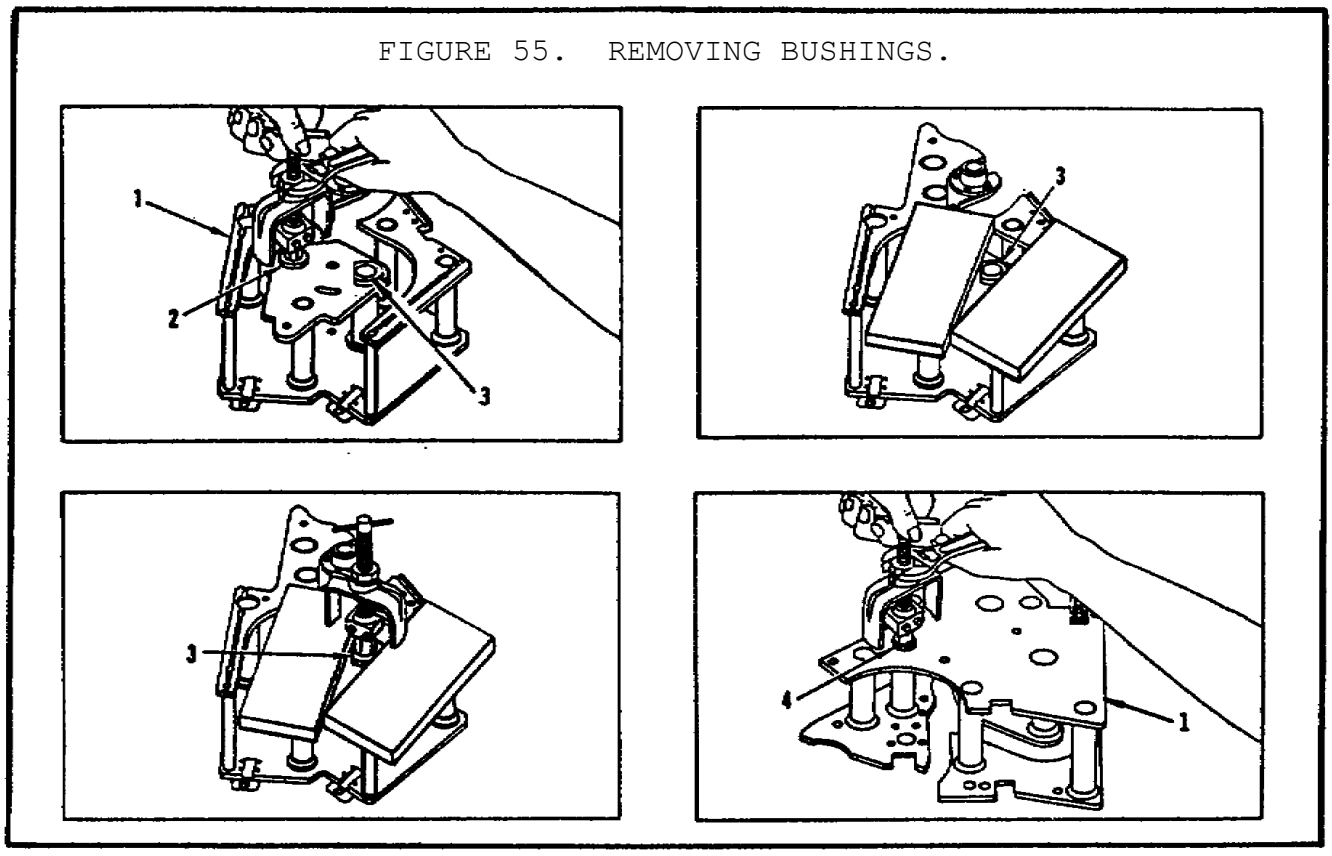
(e) *Equipment Condition.* Forward feed assembly removed from feeder assembly.

(2) *Procedural Steps for Disassembly of the Forward Feed Assembly.*

Step 1. Place forward feed assembly (1) on a clean, flat surface (see figure 55 on the following page).

Step 2. Using an adjustable wrench and inside puller, remove and discard round flanged bushing (2) from forward feed assembly (1).

FIGURE 55. REMOVING BUSHINGS.



Step 3. Using a marking pencil, mark the flat side position of flanged bushing (3). Place two blocks of wood on both sides of the flat-sided flanged bushing (3) as shown in figure 55.

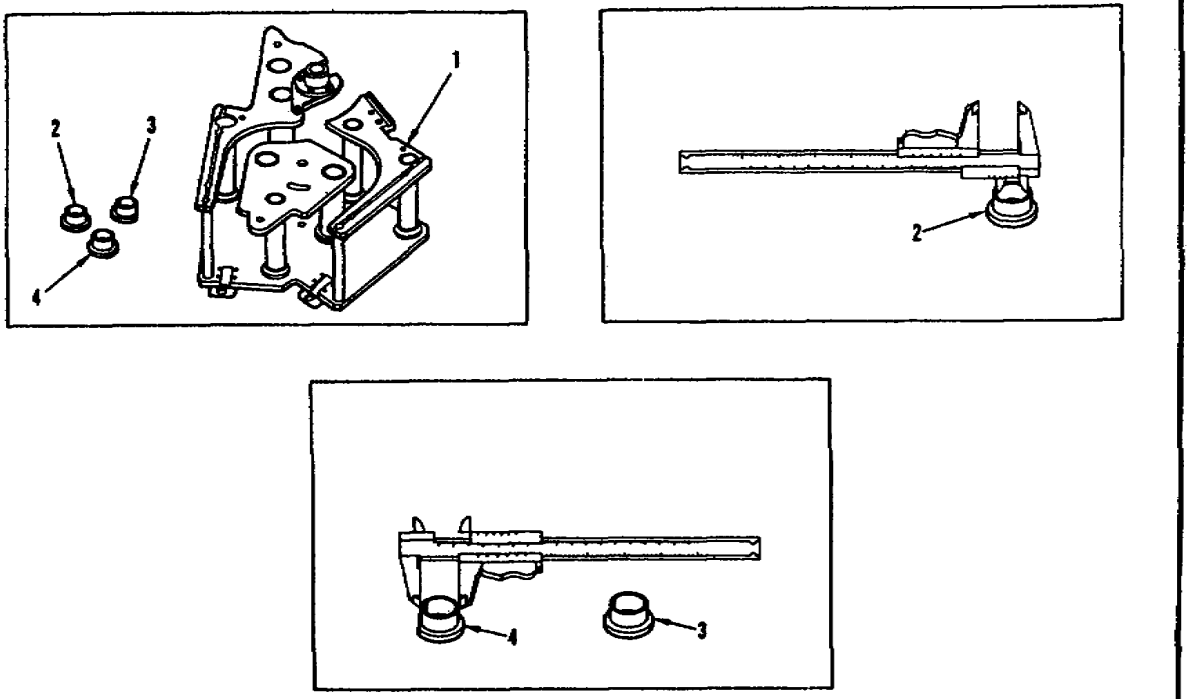
Step 4. Install inside puller into flat-sided flanged bushing (3) so that the legs of the inside puller are on two blocks of wood. Using an adjustable wrench and inside puller, remove and discard flat-sided flanged bushing (3).

Step 5. Turn over the forward feed assembly (1) and use an adjustable wrench and inside puller to remove round flanged bushing (4). Discard flanged bushing.

(3) *Procedural Steps for Inspection/Repair of the Forward Feed Assembly.*

Step 1. Visually inspect forward feed assembly (1) and three new flanged bushings (2, 3, 4) for cracks, chips, breaks, galls, and bends (see figure 56 on the following page). If the above conditions are found, new parts would be obtained and visually inspected.

FIGURE 56. INSPECTING FORWARD FEED ASSEMBLY PARTS.



NOTE

The two round, flanged bushings look the same, but they are different. One bushing has a large inside bevel on the flanged end; the other has a smaller inside bevel.

Step 2. Using vernier calipers, check new round, large inside-bevel flanged bushing (2) for inside diameter of 0.808 ± 0.002 inch (20.2 ± 0.05mm) and for outside diameter of 1.062 ± 0.005 inch (26.543 ± 0.013mm). If the above diameters are not within tolerance, a new bushing would be obtained and checked.

Step 3. Using vernier calipers, check the other two new flanged bushings (3, 4) for inside diameters of 0.883 ± 0.0010 inch (22.091 ± 0.026mm) and for outside diameters of 1.061 ± 0.0004 inch (26.533 ± 0.01mm). If the above diameters are not within tolerance, obtain a new bushing and repeat this step.

(4) *Procedural Steps for Assembly of the Forward Feed Assembly.*

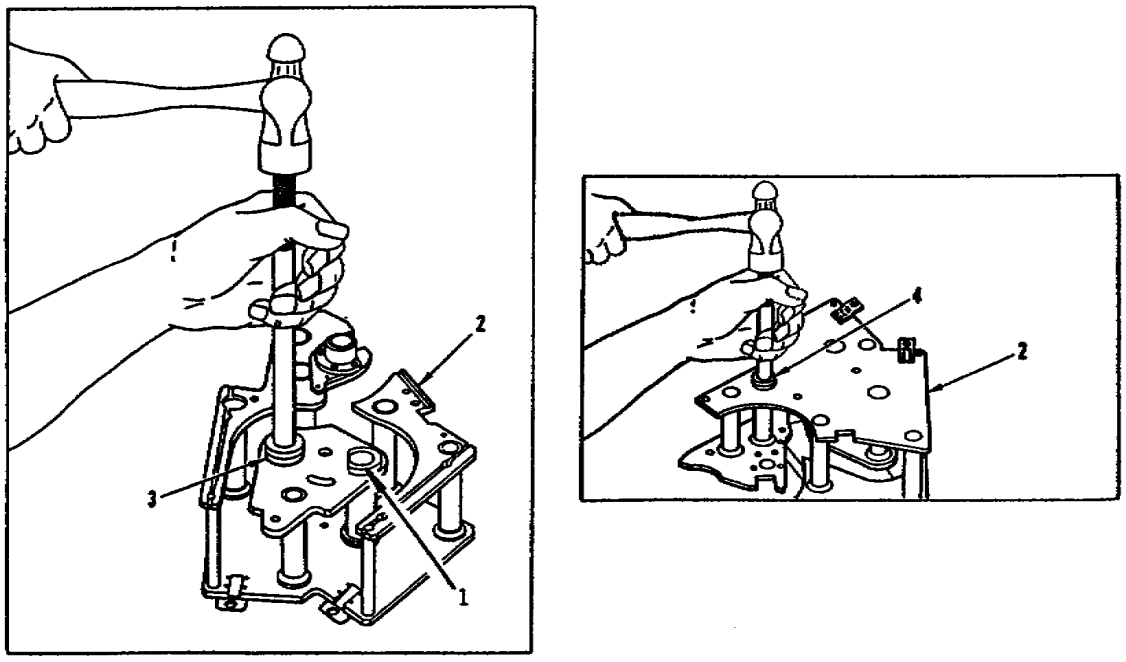
Step 1. Align the flat-sided flanged bushing (1) with the marks that were drawn on the forward feed assembly (2)(see figure 57).

NOTE

Ensure that the flat side portion of the flange is aligned with the marks drawn on the forward feed assembly when seated.

Step 2. Use hammer and bushing driver set to install flat-sided flanged bushing (1) until bushing is seated into forward feed assembly (2) (see figure 57).

FIGURE 57. INSTALLING BUSHINGS.



NOTE

The two round, flanged bushings look the same, but one bushing has a large inside bevel on the flanged end and the other has a smaller inside bevel.

Step 3. Use a hammer and bushing driver set to install round, small inside-bevel flanged bushing (3) until bushing is seated into forward feed assembly (2)(see figure 57 on the previous page).

Step 4. Turn over forward feed assembly (2) and install round, large inside-bevel flanged bushing (4), using a hammer and bushing driver set, until bushing is seated into forward feed assembly (2).

(5) *Follow-On Maintenance*. The follow-on maintenance for this procedure would be to install the forward feed assembly onto the feeder assembly.

3. Conclusion

This task provided examples of four maintenance procedures that can be performed on a defective feeder assembly. These examples were provided to give a general view of procedures that can be found when the feeder assembly must be repaired. When the mechanic is performing maintenance on the M242 machinegun, he should obtain the unit and intermediate direct support (IDS) maintenance manuals, TM 9-1005-200-20&P and TM 9-1005-200-30&P. These manuals will provide the necessary information for feeder assembly repair.

LESSON 1

OPERATION AND MAINTENANCE OF THE
M242 AUTOMATIC GUN

TASK 3. Describe the disassembly, inspection, repair, and assembly procedures for the recoil and damper mechanisms on the M242 automatic gun.

CONDITIONS

Within a self-study environment and given the subcourse text, without assistance.

STANDARDS

Within two hours

REFERENCES

No supplementary references are needed for this task.

1. Introduction

The recoil mechanism and damper assembly are located on the receiver assembly of the M242 machinegun. When these components are malfunctioning, it causes the machinegun to become nonoperational. They are removed from the machinegun by unit maintenance and given to intermediate direct support (IDS) maintenance for repair. This task will contain examples of maintenance procedures that an IDS mechanic would use when repairing the recoil mechanism and damper assembly. The examples are provided to give a general idea of the steps that a mechanic would have to follow during repair.

2. Maintenance of the Receiver Assembly

a. *General*. Receiver assembly maintenance tasks are used to repair or replace intermediate direct support (IDS) level assemblies or subassemblies when they are received from unit maintenance. Typical repair (service) or replacement tasks covered in this task may cover removal, disassembly, inspection/repair, lubrication, assembly, testing, and installation and are:

(1) Repair Recoil Mechanism

(2) Repair Recoil Mechanism:
Repair Damper Assembly

b. *Repair Recoil Mechanism*. This task will cover the disassembly, cleaning, inspection/repair, lubrication, and assembly of the recoil mechanism.

(1) *Initial Setup*.

(a) *Applicable configurations*. All.

(b) *Tools*. Small arms repairer tool kits, recoil spring compression tool, spanner wrench, recoil clamp assembly.

(c) *Materials/Parts*. 0.032 inch diameter lockwire, grease, wiping rag, dry cleaning solvent.

(d) *Personnel Required*. Two small arms repairers and a helper.

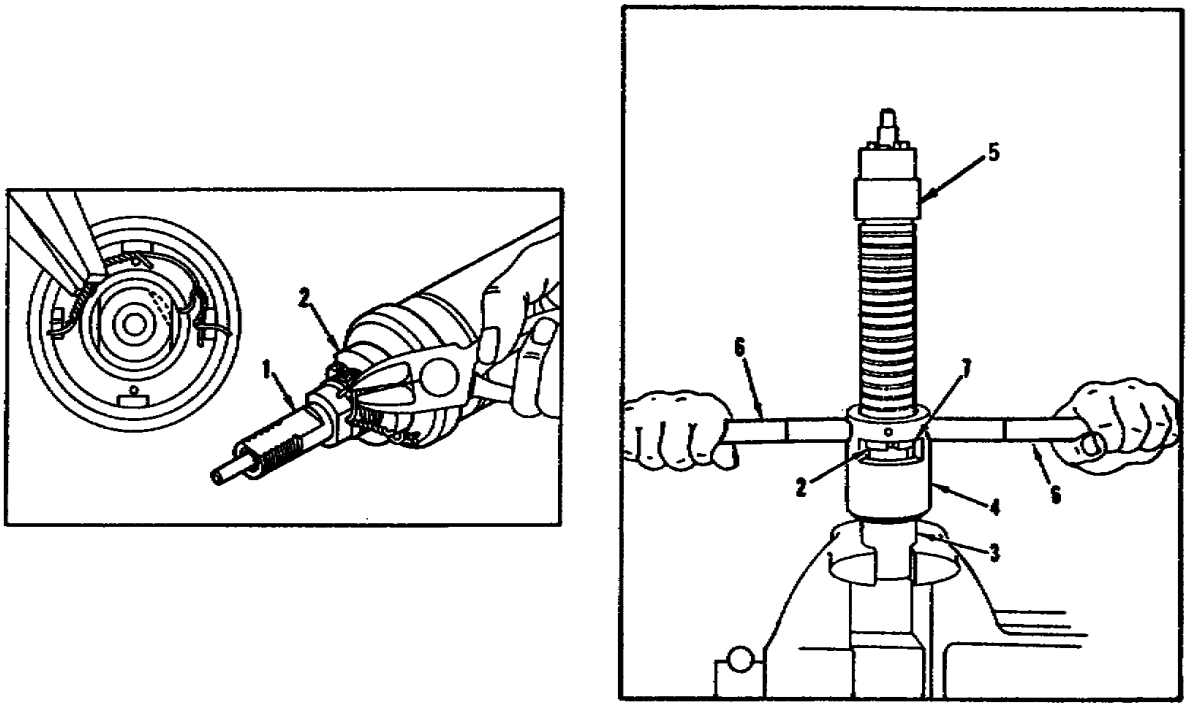
(e) *Equipment Conditions*. Recoil mechanism removed from barrel support assembly.

(2) *Procedural Steps for Disassembly of the Recoil Mechanism*.

Step 1. Using diagonal-cutting pliers and duckbill pliers, remove lockwire that connects damper assembly (1) and retaining nut (2)(see figure 58 on the following page).

Step 2. Place center section (3) in vise jaws. Turn outer section (4) counterclockwise to bottom on center section (3) (figure 58).

FIGURE 58. DISASSEMBLING RECOIL MECHANISM.



Step 3. Place recoil mechanism (5) in recoil spring compression tool outer section (4). Screw recoil mechanism (5) into center section (3).

Step 4. Install handles (6) in outer section (4) of recoil spring compression tool (3, 4). Using handles (6), turn the outer section (4) of recoil spring compression tool clockwise until all of the retaining nut (2) can be seen in the cutout (7) of tool (4) as shown in figure 58.

Step 5. Using spanner wrench, loosen retaining nut (2) and completely unscrew. Reinstall nut (2) back on first two threads.

Step 6. Using handles (6), turn the outer section (4) of the recoil spring compression tool counterclockwise until spring pressure is released on tool and remove tool handles (6).

Step 7. Using a 15 inch adjustable wrench, remove recoil mechanism (5) from recoil spring compression tool (3, 4).

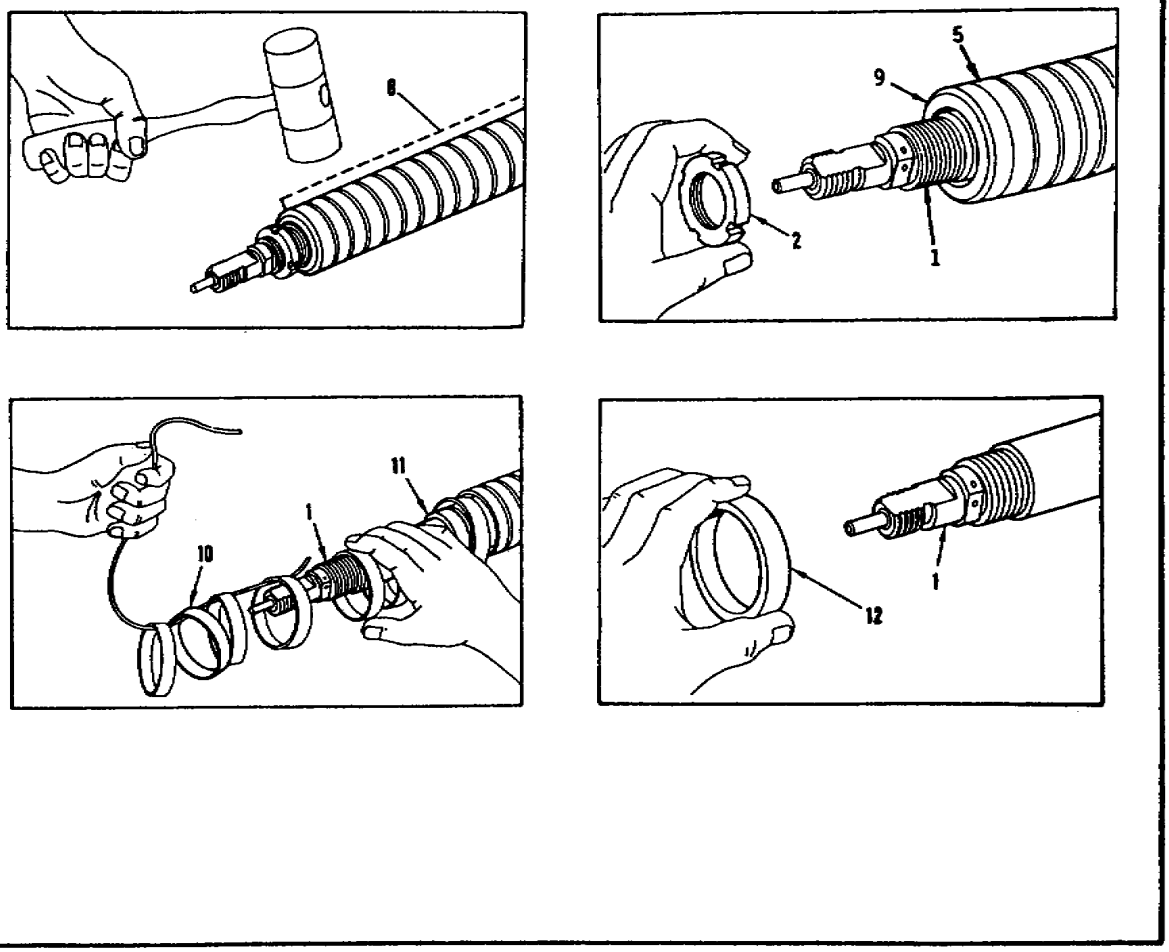
Step 8. Using a plastic-face hammer, tap each segment of spring set (8) to ensure that segments are not stuck together (see figure 59).

Step 9. Remove retaining nut (2) from recoil mechanism (5) and slide recoil sleeve (9) from damper assembly (1).

NOTE

Spring segments should be kept in order of removal.

FIGURE 59. DISASSEMBLING RECOIL MECHANISM SPRING SETS.



Step 10. Obtain two 24 inch pieces of lockwire. Using one piece of wire, slide large outer spring set segments (10) over smaller inner spring set segments (11) onto wire loop and close wire loop. Use plastic-face hammer to loosen small inner spring set segments (11) (see figure 59 on the previous page).

Step 11. Slide small inner spring set segments (11) from damper assembly (1) onto remaining wire loop and then close wire loop.

Step 12. Slide recoil spring spacer (12) from damper assembly (1).

(3) *Procedural Steps for Cleaning the Recoil Mechanism.*

WARNING

Dry cleaning solvent is flammable and should not be used near an open flame or in a smoking area. Use only in well-ventilated areas. This solvent evaporates quickly and has a drying effect on the skin. When used without gloves, it may cause cracks in the skin and in some cases mild irritation or inflammation.

CAUTION

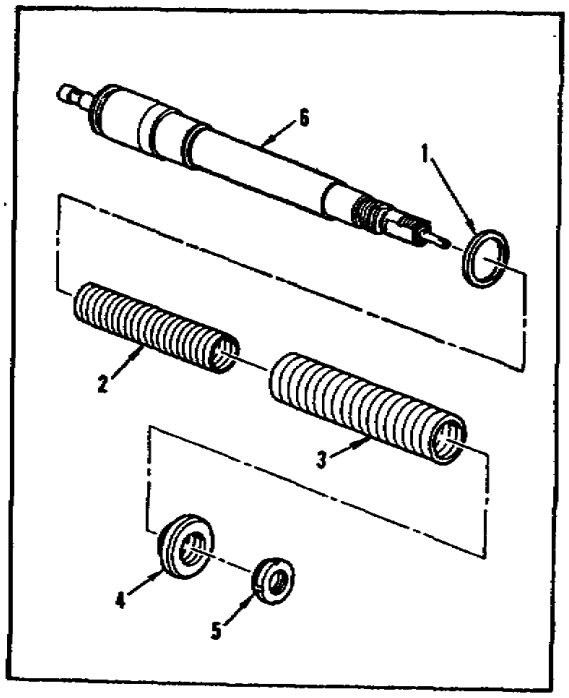
Do not immerse the damper assembly into solvent because it will damage packing.

NOTE

Do not remove spring set segments from wire loop during cleaning. Inner and outer spring sets are a matched set and should be kept in the same order as when originally removed from the damper assembly.

Step 1. Using cleaning brush and dry cleaning solvent, clean recoil spring spacer (1), outer and inner spring sets (2, 3), recoil spring sleeve (4), and retaining nut (5). Dip rag in dry cleaning

FIGURE 60. CLEANING, INSPECTING, AND LUBRICATING THE RECOIL MECHANISM PARTS.



solvent and wipe the damper assembly (6) clean of all grease and dirt (see figure 60).

(4) *Procedural Steps Inspection/Repair of the Recoil Mechanism.*

Step 1. Visually inspect recoil spring spacer (1), of each spring set (2, 3), recoil spring sleeve (4), retaining nut (5), and damper assembly (6) for cracks, chips, galls, breaks, bends, and/or stripped threads (figure 60).

NOTE

Inner and outer spring sets are only replaced as a set.

Step 2. Replace defective parts and then repeat the visual inspection for the replacement parts.

(5) *Procedural Steps for Lubrication of the Recoil Mechanism.*

Step 1. Apply a heavy coat of grease to the recoil spring spacer (1), of spring sets (2, 3), recoil spring sleeve (4), and part of the damper assembly (6) covered by the spring sets. (see figure 60 on the previous page).

(6) *Procedural Steps for Assembly of the Recoil Mechanism.*

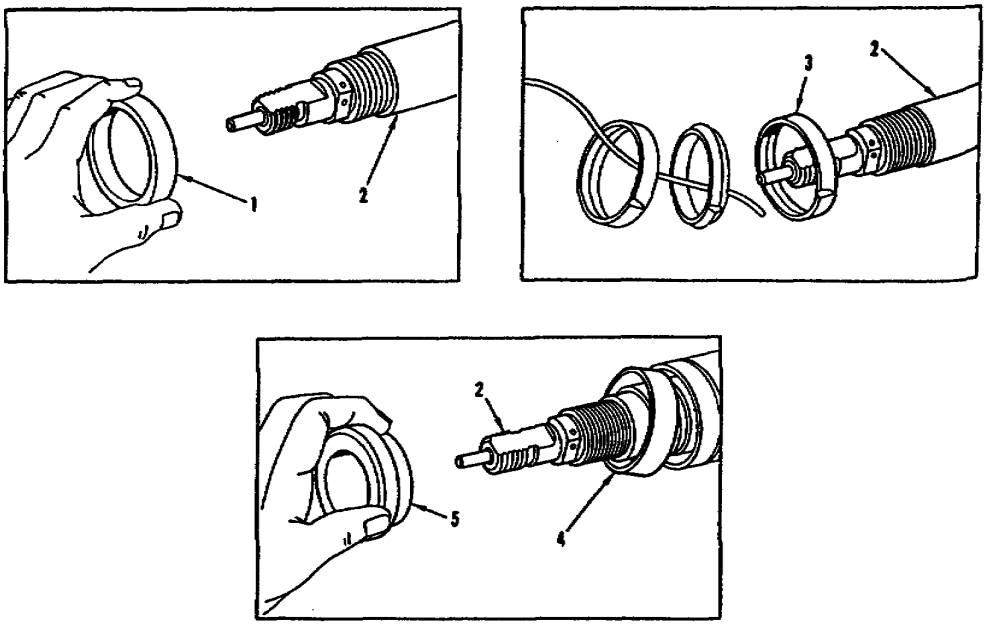
Step 1. Slide recoil spring spacer (1) on damper assembly (2) (see figure 61).

NOTE

The first and last small spring set segment will be an inside bevel.

Step 2. Open small spring set wire loop and slide small spring set segments (3) onto damper assembly (2) in the same order as when removed. Make sure the first segment is an inside bevel, the next an outside bevel, and so forth as shown in figure 61.

FIGURE 61. ASSEMBLING RECOIL MECHANISM SPRING SETS.



NOTE

The first and last large spring set segment will be a half ring with an outside bevel.

Step 3. Open large spring set wire loop and slide the large spring set segments (4) over the small spring set segments (3) already on damper assembly (2). Make sure the first segment is a half ring with outside bevel, the next a full ring with inside bevel and so forth as shown in figure 61 on the previous page.

NOTE

Stack tight and even up spring set segments before the next step.

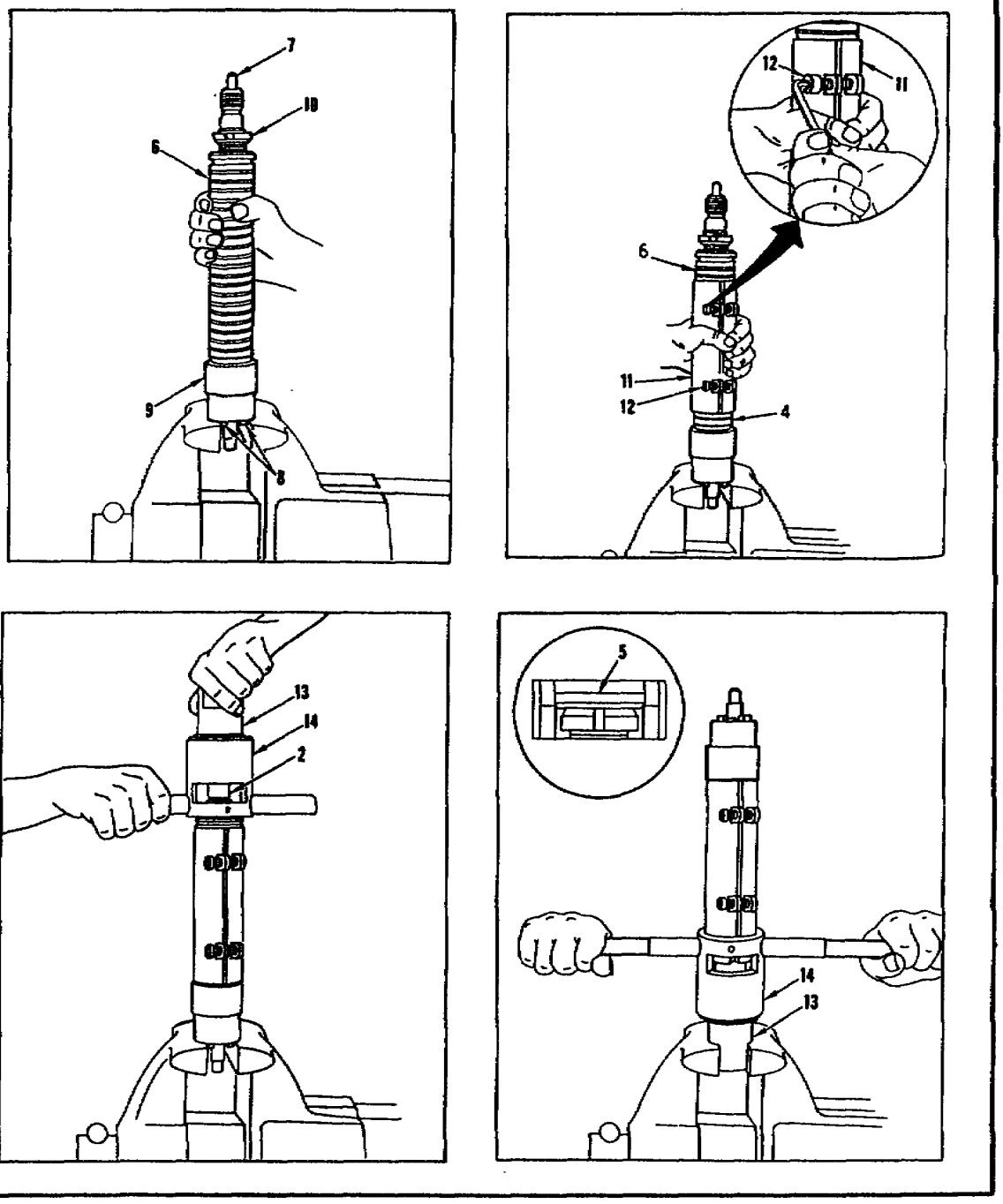
Step 4. Slide small end of recoil spring sleeve (5) over damper assembly (2) and segment (4)(see figure 61).

Step 5. Place recoil mechanism (6) into vise with reservoir piston (7) on top. Before tightening the vise, ensure the vise jaws are mated with the shoulders (8) on the damper housing cap (9). Tighten the vise and place retaining nut (10) on recoil mechanism (6) with the safety wire hole in nut at top (see figure 62 on the following page).

Step 6. Using a 5mm hex key, open recoil spring aliner assembly (11) by turning two socket head capscrews (12) clockwise. Slide recoil spring aliner assembly (11) onto recoil mechanism (6) to cover spring set segments (4). Close recoil spring aliner assembly (11) by turning two socket head capscrews (12) counterclockwise.

Step 7. Place the recoil spring compression tool over top of the damper assembly (2). Hold center section (13) and turn outer section (14) of tool clockwise until six threads can be seen in cutout of tool. Screw entire tool clockwise onto threads of damper assembly (2) until tight (see figure 62).

FIGURE 62. ASSEMBLING RECOIL MECHANISM.



Step 8. Remove recoil mechanism and compression tool from vise. Place center section (13) of compression tool in vise and turn outer section (14) clockwise on recoil mechanism until tight against recoil spring sleeve (5) (see figure 62).

CAUTION

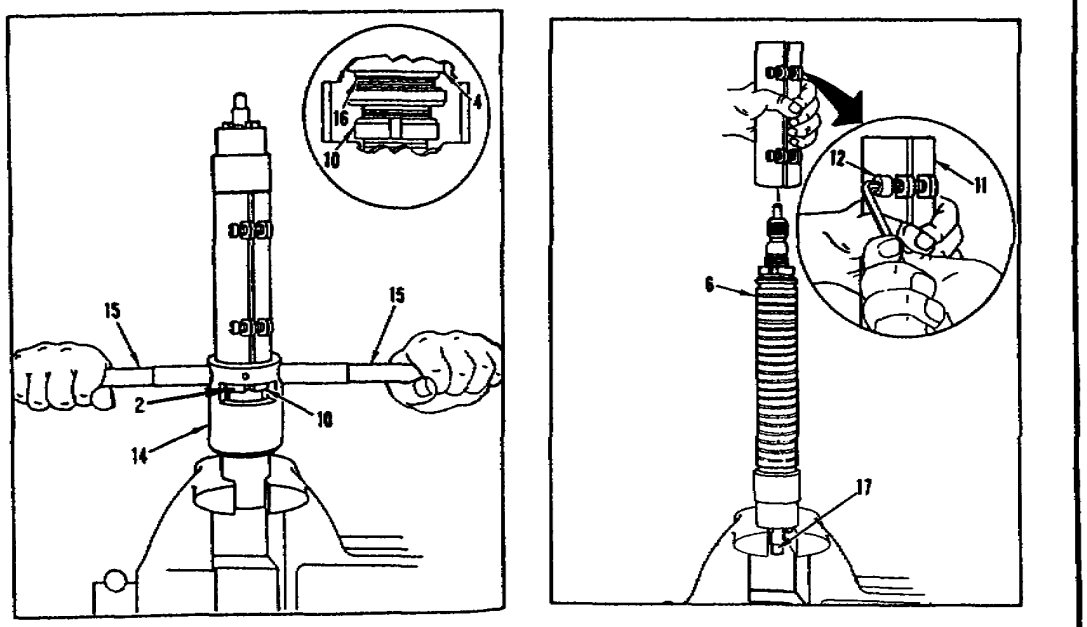
Be absolutely sure that recoil mechanism is securely held by recoil spring compression tool.

NOTE

Helper must assist to turn outer section of compression tool.

Step 9. Install handles (15) (figure 63) into outer section (14) of recoil spring compression tool. Using handles (15), turn the outer section (14) of recoil spring compression tool until all of the spring segments (4) are above shoulder (16) of the recoil spring support. Use spanner wrench and torque wrench to torque retaining nut (10) to 270 ± 30 in-lb (311 ± 34.5 cm-kg).

FIGURE 63. ASSEMBLING RECOIL MECHANISM (CONTINUED).



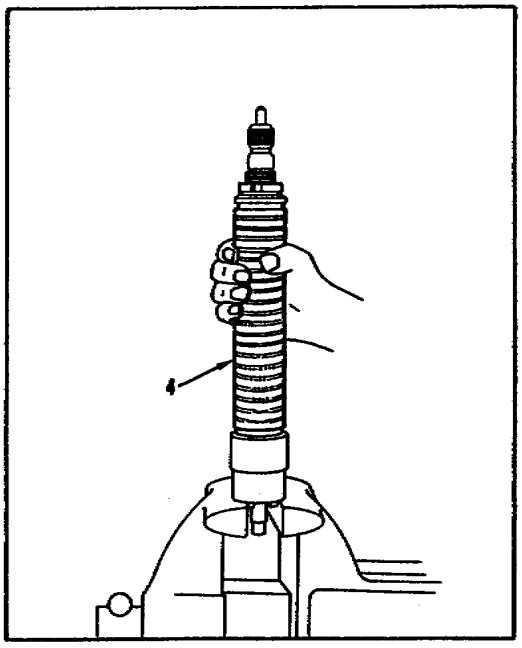
Step 10. Using handles (15), turn the outer section (14) of recoil spring compression tool until spring pressure is released against retaining nut (10).

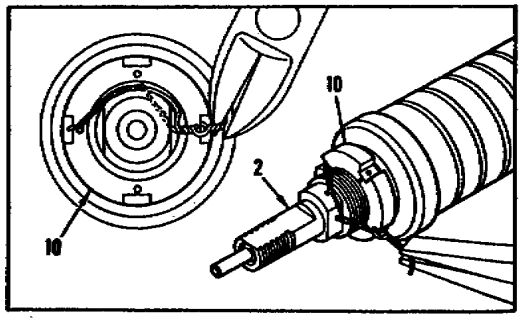
Step 11. Using 15 inch adjustable wrench, remove damper assembly (2) from recoil spring compression tool, then remove recoil spring compression tool from vise.

Step 12. Place recoil mechanism (6) in vise with the damper valve (17) down. Using a 5mm hex key, open recoil spring aliner assembly (11) by turning two socket head screws (12) clockwise. Slide recoil spring aliner assembly (11) up and off recoil mechanism (6).

Step 13. Check spring set segments (4) for uneven spacing or cocked segments (see figure 64). If above conditions are found, disassemble spring sets and then repeat assembly. Remove recoil mechanism from vise when segments are properly spaced.

FIGURE 64. CHECKING SPRING SET ALIGNMENT AND INSTALLING LOCKWIRE.





Step 14. Using duckbill pliers and 0.032 inch diameter lockwire, lockwire retaining nut to damper assembly (2) and cut off excess lockwire with diagonal-cutting pliers. Push pigtail into recess of retaining nut (10).

(7) *Follow-On Maintenance*. The follow-on maintenance for this procedures would be to install the recoil mechanism into the barrel support assembly.

c. *Repair Damper Assembly*. This task will cover the disassembly, cleaning, inspection/repair, assembly, test, and service of the damper assembly.

(1) *Initial Setup*.

(a) *Applicable Configurations*. All.

(b) *Tools*. Small arms repairer tool kits, packing extractor kit, headed straight pin, air hose, and adapter fitting.

(c) *Materials/Parts*. Damper assembly repair kit, wiping rag, dry cleaning solvent, damper fluid, lockpin.

(d) *Personnel Required*. Small arms repairer and helper.

(e) *Equipment Conditions*. Recoil mechanism disassembled.

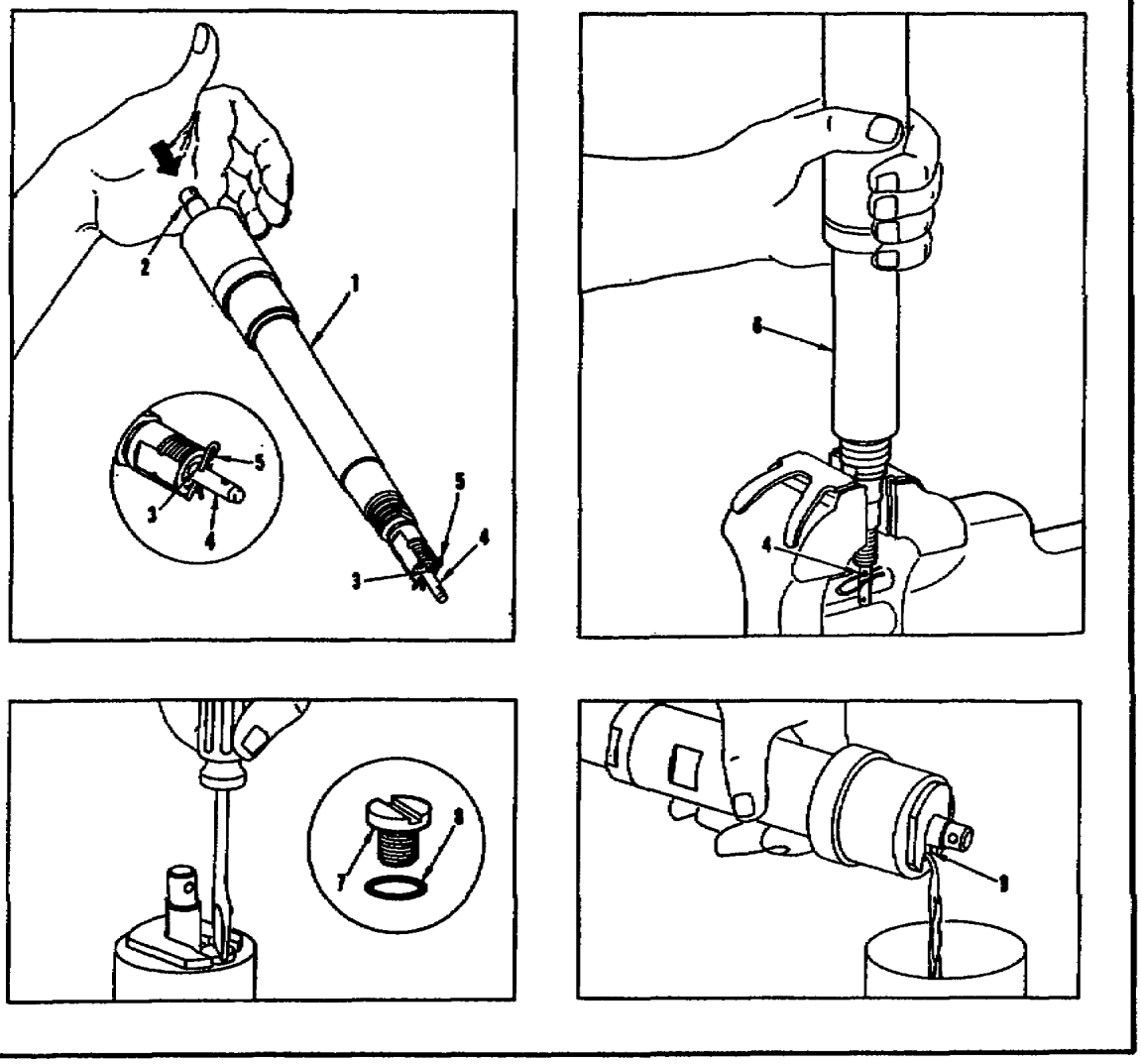
(2) *Procedural Steps for Disassembly of the Damper Assembly*.

Step 1. Place damper assembly (1) on clean work surface. Press damper valve rod (2) until second hole (3) in reservoir piston rod (4) can be seen. Insert lockpin (5) in second piston rod hole (3) (see figure 65 on the following page).

CAUTION

Spring support threads may be damaged if clamped in a vise. Clamp vise jaws only on support flats.

FIGURE 65. REMOVING DAMPER FLUID.



Step 2. Place spring support (6) into a vise that has protective jaw caps with piston rod (4) at bottom.

Step 3. Use flat-tip screwdriver (see figure 65) to remove damper housing plug (7) and packing (8). Discard packing and then remove spring support from vise.

CAUTION

Do not reuse damper fluid. Dispose of damper fluid in waste oil container. Contaminated damper fluid could damage damper assembly.

Step 4. Drain damper fluid from filler hole (9) (figure 65 on the previous page) and discard fluid.

CAUTION

Spring support threads may be damaged if clamped in a vise. Clamp vise jaws only on support flats.

Step 5. Place spring support (6) in vise with piston rod (4) at bottom.

NOTE

A helper will be needed to hold spring support during step 6.

Step 6. Using a 15 inch adjustable wrench, unscrew damper housing cap (10) (figure 66 on the following page) from spring support (6) and then remove damper housing cap (10).

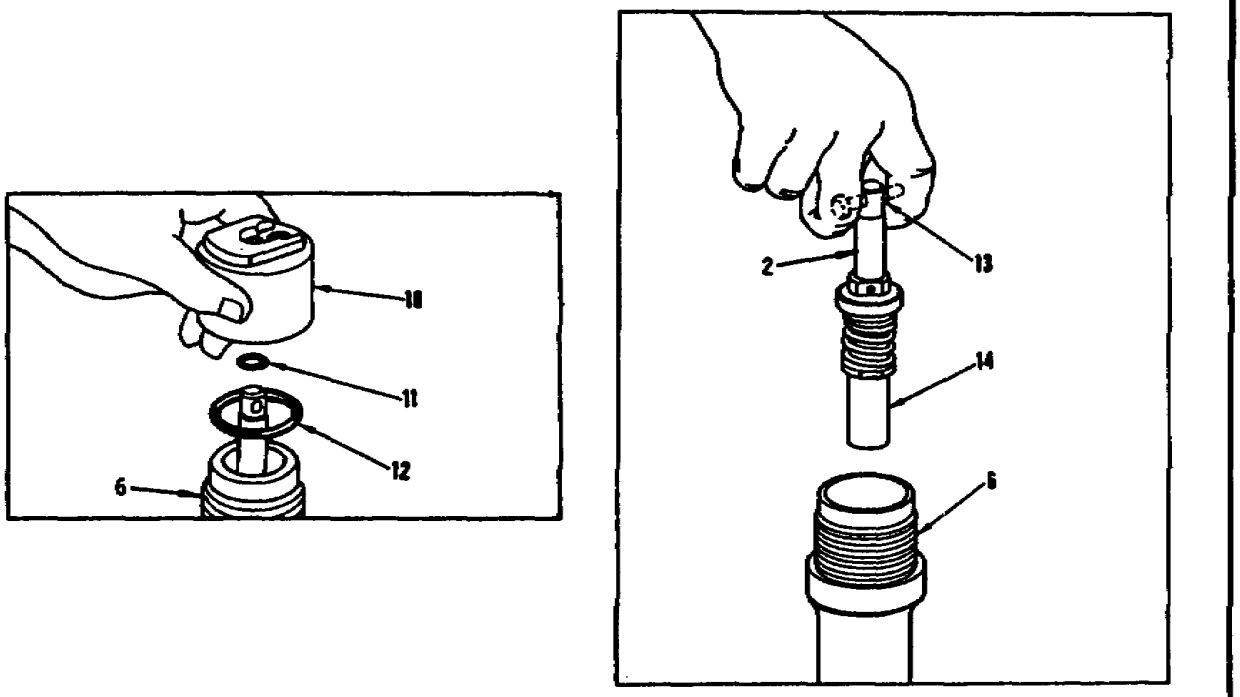
CAUTION

Sharp tools may damage packing grooves. Use only plastic or brass extractor for packing removal.

Step 7. Remove and discard damper housing cap packings (11, 12) which are recessed under damper housing cap (10).

Step 8. Install recoil spring cap headed straight pin (13) into hole in damper valve rod (2). Use recoil spring cap headed straight pin (13) and lift straight up on damper valve assembly (14) to break suction seal. Remove damper valve assembly (14) and then remove headed straight pin (13) from damper valve assembly (14). Remove spring support (6) from vise. Drain off and discard any remaining damper fluid.

FIGURE 66. REMOVING DAMPER VALVE ASSEMBLY.



WARNING

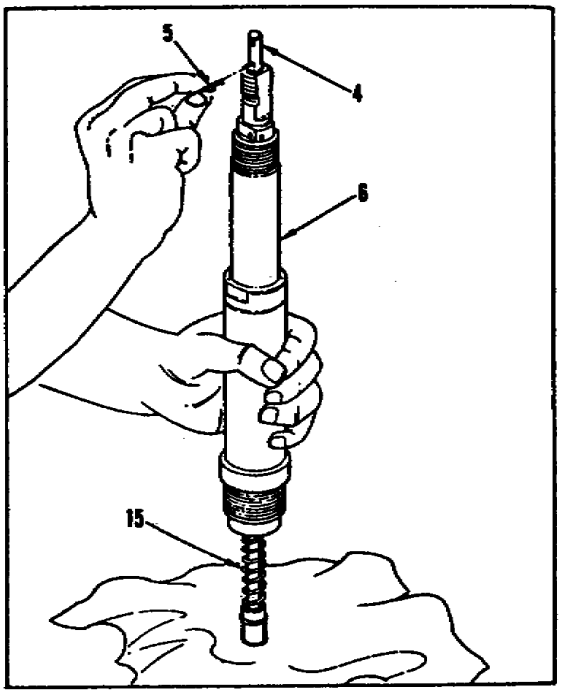
Reservoir piston rod is under spring tension.

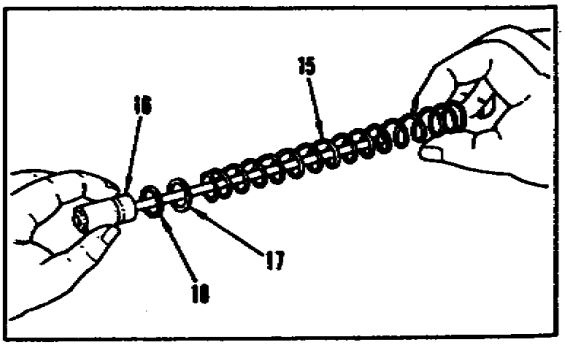
Step 9. Place a wiping rag on a clean, flat surface. Position spring support (6) on rag, with reservoir piston rod (4) at top (see figure 67 on the following page).

Step 10. Lift spring support (6) six inches above rag and pull lockpin (5) out of reservoir piston rod (4), releasing tension on reservoir piston spring (15).

Step 11. Pull reservoir piston (16) from spring support (6) and then remove spring (15), retainer (17), and packing (18) from reservoir piston (16). Discard retainer and packing.

FIGURE 67. REMOVING RESERVOIR PISTON.





CAUTION

Sharp tools may damage packing grooves. Use only plastic or brass extractor for packing removal.

Step 12. Remove and discard packing (19) from inside spring support (6) (see figure 68 on the following page).

Step 13. Use long, round nose pliers to remove oil seal (20) from spring support (6). Discard oil seal.

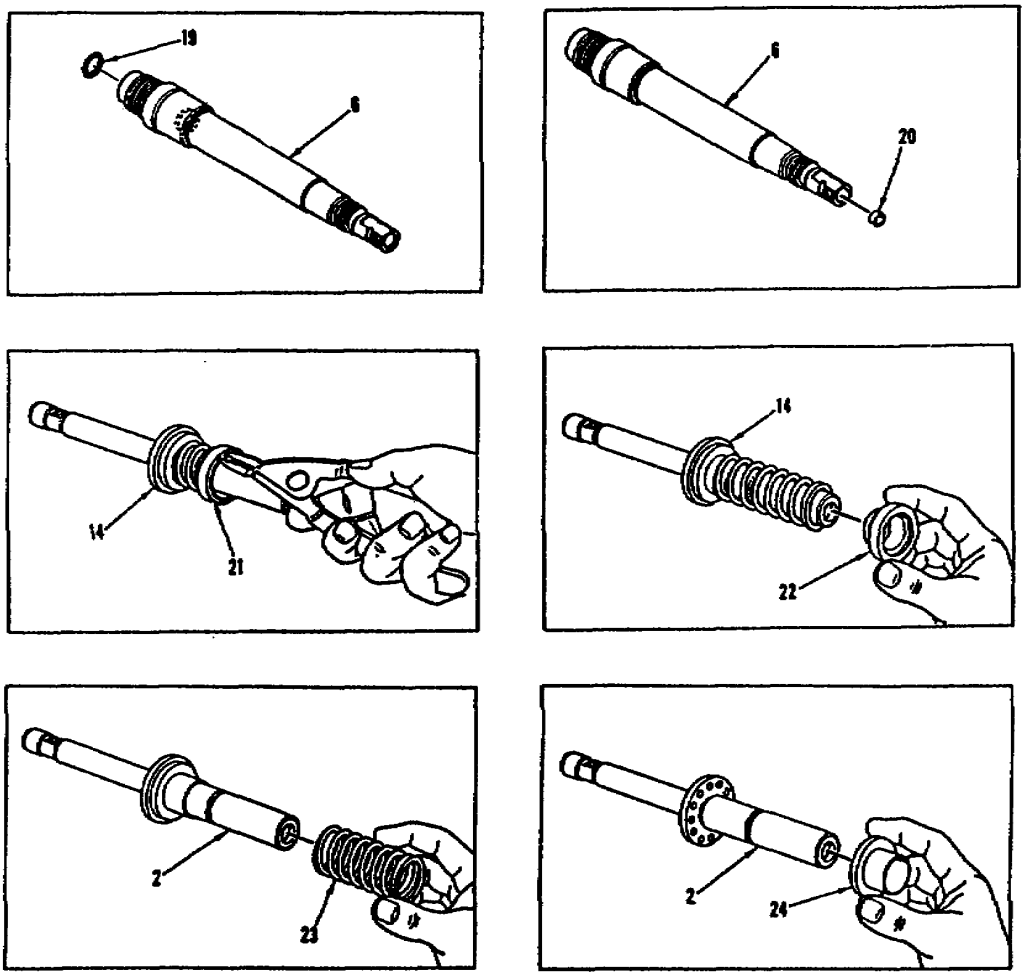
WARNING

Damper valve assembly is under spring tension.

Step 14. Using retaining ring pliers, remove retaining ring (21) from damper valve assembly (14) and then remove damper spring spacer (22) from damper valve assembly (14) (see figure 68).

Step 15. Remove damper rod spring (23) from rod (2) and remove damper valve (24) from rod (2).

FIGURE 68. REMOVING SPRING SUPPORT PACKING AND OIL SEAL, AND DISASSEMBLING DAMPER VALVE ASSEMBLY.



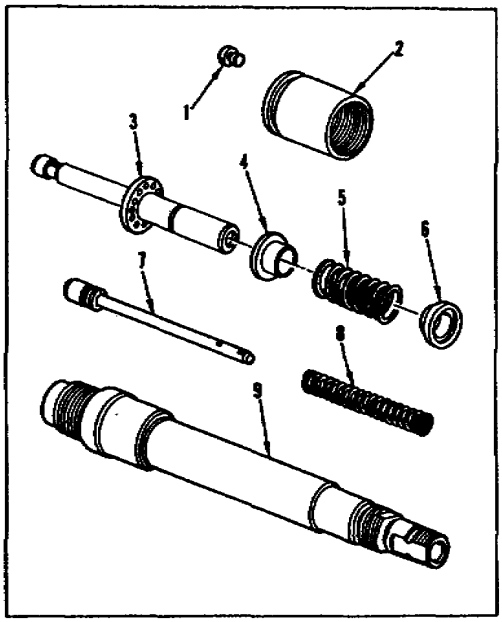
(3) *Procedural Steps for Cleaning the Damper Assembly.*

WARNING

Dry cleaning solvent is flammable and should not be used near an open flame or in a smoking area. Use only in well-ventilated areas. This solvent evaporates quickly and has a drying effect on the skin. When used without gloves, it may cause cracks in the skin and in some cases mild irritation or inflammation.

Step 1. Immerse damper housing plug (1), damper housing cap (2), damper rod (3), damper valve (4), damper rod spring (5), damper spring spacer (6), reservoir piston (7), reservoir piston spring (8), and spring support (9) in dry cleaning solvent (see figure 69). Clean parts with a cleaning brush and air dry.

FIGURE 69. CLEANING AND INSPECTING DAMPER ASSEMBLY PARTS.



(4) *Procedural Steps for Inspection/Repair of the Damper Assembly.*

Step 1. Using a steel rule, check damper rod spring (5) for free length of 1 3/4 ± 1/64 inch (44.45 ± 0.4mm)(see figure 69 on the previous page).

Step 2. Check reservoir piston spring (8) for free length of 6 13/32 ± 1/32 inch (162.7 ± 0.8mm).

Step 3. A new spring would be obtained if spring length was incorrect. Steps 1 and 2 would be repeated for the replacement spring.

Step 4. Visually inspect damper housing plug (1), damper housing cap (2), damper rod (3), damper valve (4), damper spring spacer (6), and reservoir piston (7) for cracks or galls.

Step 5. If galls or cracks are found during the above inspection, obtain new parts and repeat inspection.

(5) *Procedural Steps for Assembly of Pamper Assembly.*

Step 1. Install new packing (1) into slot inside spring support (2)(see figure 70 on the following page).

Step 2. Insert oil seal (3), flat end first, into tip of spring support (2).

Step 3. Install damper valve (4), large end first, on damper rod (5).

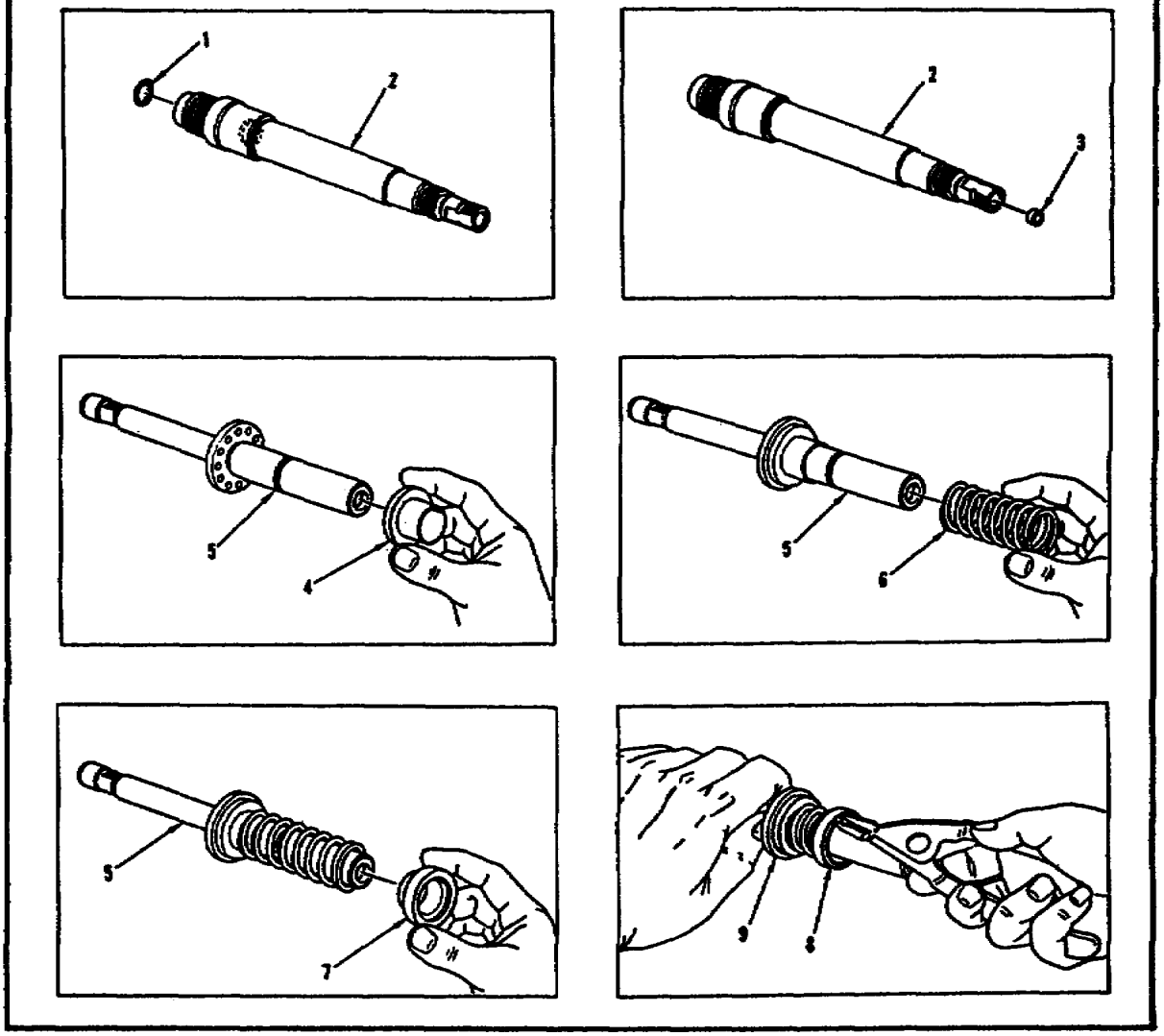
Step 4. Install damper rod spring (6) on damper rod (5).

Step 5. Install spacer (7), small end first, on damper rod (5).

Step 6. Using retaining ring pliers, install retaining ring (8) on damper valve assembly (9). Ensure that retaining ring (8) is seated in slot.

Step 7. Lubricate new packing (10) with damper fluid and install new packing (10) and retainer (11). Then, install reservoir piston spring (12) (see figure 71 on page 97).

FIGURE 70. INSTALLING SPRING SUPPORT PACKING AND OIL SEAL, AND ASSEMBLING DAMPER VALVE ASSEMBLY.



Step 8. Insert rod end of reservoir piston (13) into spring support (2). Cut 1/8 inch (3mm) diameter metal rod stock to a 12 inch (300mm) long rod (14). Insert 1/8 inch by 12 inch (3mm by 300mm) rod (14) into end of reservoir piston (13).

Step 9. Place wiping rag on clean, flat surface and position spring support (2) with 1/8 inch by 12 inch (3mm by 300mm) rod (14) at bottom on rag. Push down on spring support (2) to force rod end of

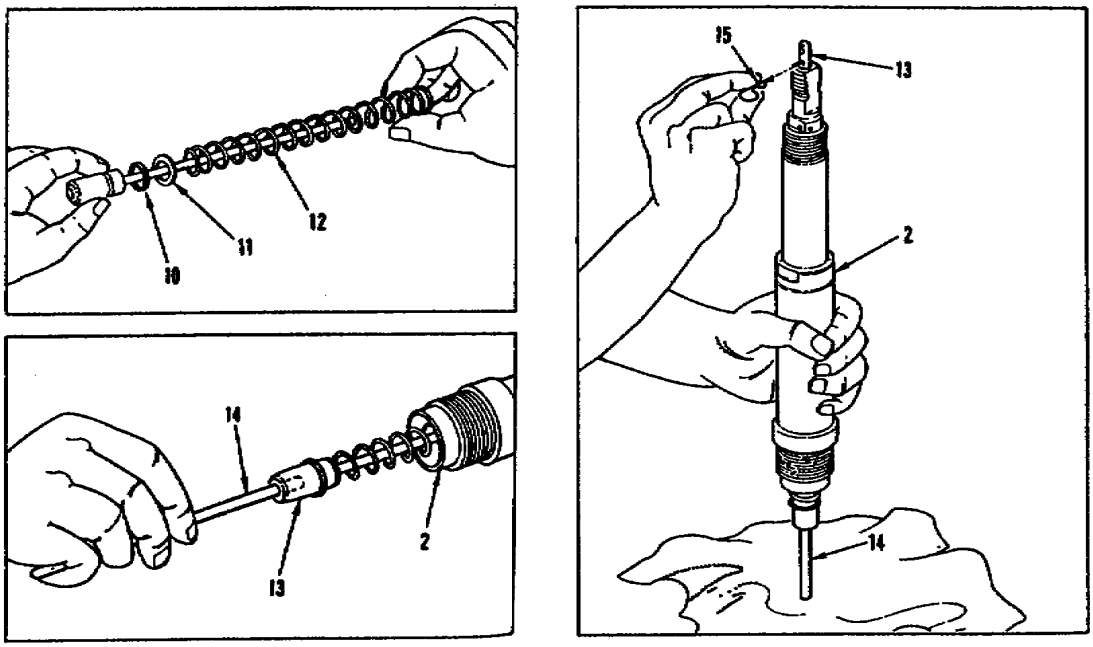
reservoir piston (13) through top of spring support (2). Install lockpin (15) through second hole in rod end of piston (13) (see figure 71).

Step 10. Remove 1/8 inch by 12 inch (3mm by 300mm) rod (14) from spring support (2).

CAUTION

Spring support threads may be damaged if clamped in a vise. Clamp vise jaws only on support flats.

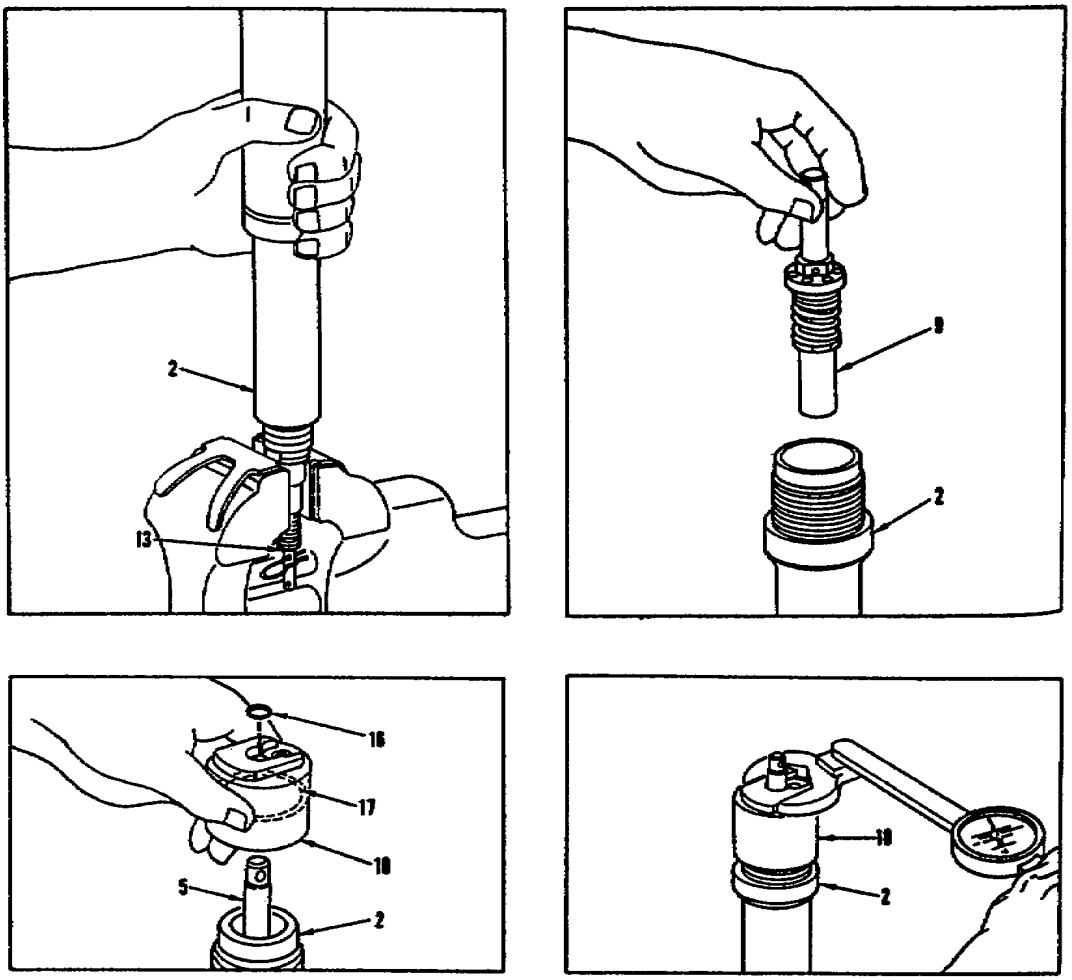
FIGURE 71. ASSEMBLING AND INSTALLING RESERVOIR PISTON.



Step 11. Place spring support (2) in vise that has protective jaw caps, with reservoir piston (13) at bottom (see figure 72 on the following page).

Step 12. Lubricate lower surface of damper valve assembly (9) using damper fluid. Insert damper valve assembly (9), with small rod end on top, into spring support (2) (see figure 72).

FIGURE 72. INSTALLING DAMPER VALVE ASSEMBLY.



NOTE

Ensure that packings are seated in their slots.

Step 13. Lubricate new packings (16, 17) with damper fluid. Insert new small packing (16) into slot in top of damper housing cap (18). Insert new large packing (17) into slot in damper housing cap (18). Lubricate upper end of damper rod (5) using damper fluid (see figure 72).

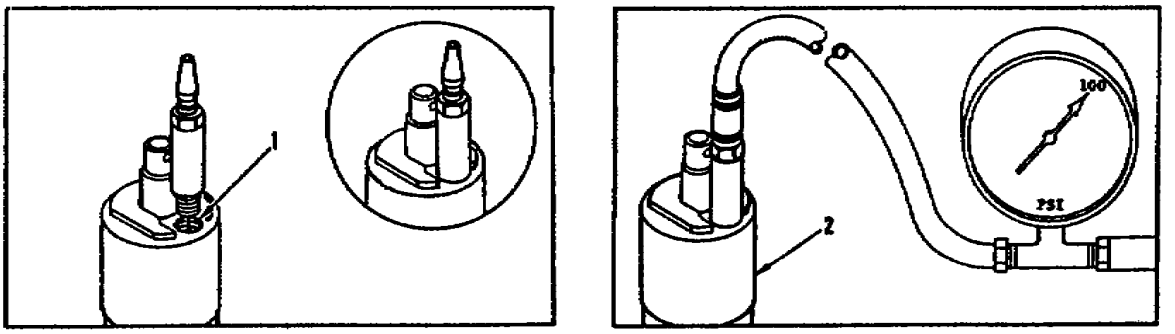
Step 14. Screw damper housing cap (18) onto spring support (2). Use 1 7/16 inch crowfoot and torque wrench to torque damper housing cap (18) to 1080 ± 120 in-lb (90 ± 10 ft-lb) (1242 ± 138 cm-kg).

(6) *Procedural Steps for Testing the Damper Assembly.*

Step 1. Screw adapter fitting into damper filler hole (1) and tighten adapter fitting (see figure 73).

Step 2. Connect air hose to adapter fitting and to air pressure source. Apply 100 pounds per square inch gage (psig) air pressure to connected hose and damper assembly (2). Remove damper assembly (2) from vise and submerge pressurized damper assembly in open container of water.

FIGURE 73. PRESSURE TESTING DAMPER ASSEMBLY.



NOTE

Water must completely cover damper assembly.

Step 3. Check damper assembly for air bubbles during a 20 minute test period. Then reduce air pressure to zero. If air bubbles were noted after the 20 minute pressure test, remove and disconnect damper assembly (2), disassemble, clean and inspect

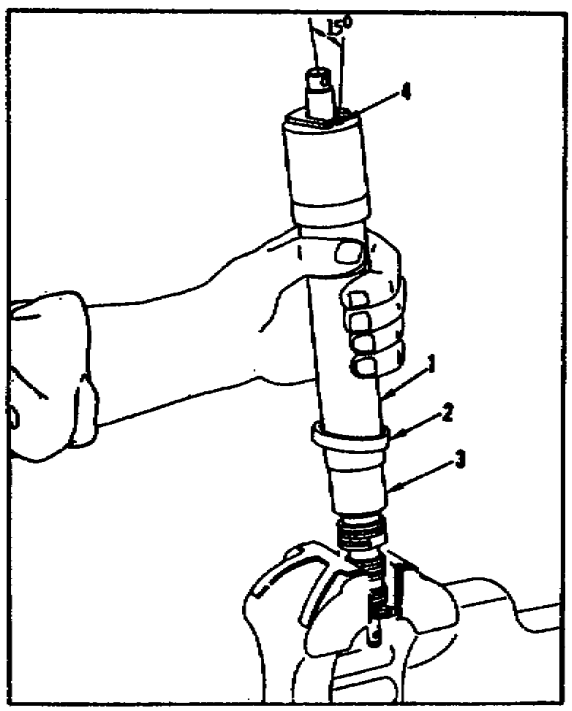
the damper assembly and replace defective parts. The damper assembly would be reassembled and then retested.

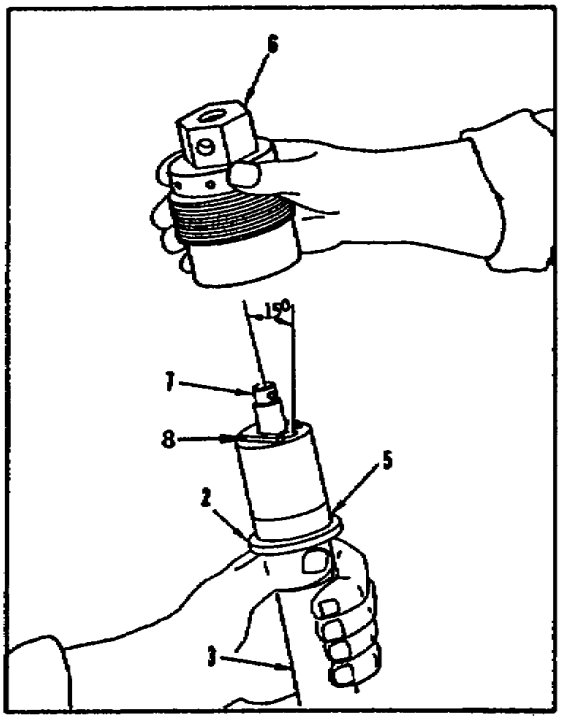
Step 4. At-the end of-the pressure test, remove the damper assembly from the water. Dry it with a clean, dry rag. Then remove the air hose and adapter fitting.

(7) Procedural Steps for Servicing the Damper Assembly.

Step 1. Remove damper cap and valve assembly. Using a syringe or syphon bottle filled with clean damper fluid, add fluid until damper assembly (1) is half full. Install damper valve assembly and cap and then remove damper assembly (1) from vise (see figure 74).

FIGURE 74. FILLING DAMPER ASSEMBLY.





Step 2. Slide recoil spring spacer (2) over threaded end of spring support (3). Place damper assembly (1) into a vise that has protective jaw caps at 15 degree angle as shown, with filler hole (4) at top (see figure 74).

Step 3. Push recoil spring spacer (2) up on spring support (3) until it seats on spring support shoulder (5). Place recoil spring cap (6) over damper rod (7) until seated against recoil spring spacer (2).

Step 4. While holding recoil spring spacer (2), push down on damper rod (7) until hole in damper rod aligns with hole in recoil spring cap (6). Friction will hold damper in aligned position.

Step 5. Remove recoil spring cap (6) without moving damper rod (7). Place a mark with a pencil on damper rod flush with damper housing cap (8). The mark is used to maintain damper position while topping-off the fluid reservoir.

NOTE

Tap side of damper housing cap during this procedure to remove air bubbles. Hold damper rod with one hand to keep rod position mark in place during steps 6 and 7.

Step 6. Use syringe or syphon bottle filled with clean damper fluid and fill damper reservoir until fluid comes from filler hole (4)(see figure 75 on the following page).

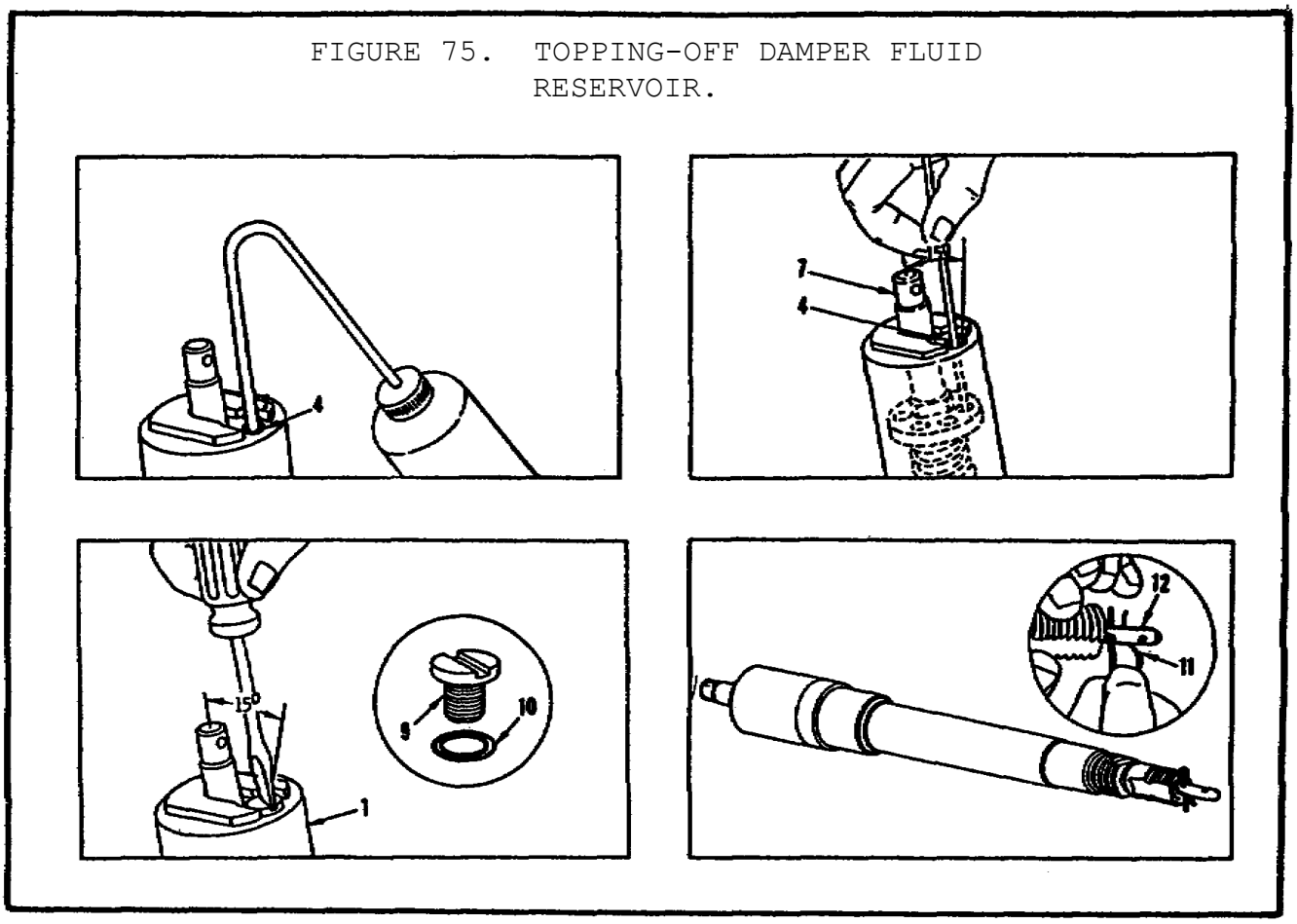
Step 7. Insert 1/8 inch by 12 inch (3mm by 300mm) rod into filler hole (4) and through a flange hole in damper rod (7) (figure 75). Push down on the 1/8 inch by 12 inch (3mm by 300mm) rod one-half inch. Hold for thirty seconds to allow fluid to flow into lower reservoir.

Step 8. Repeat steps 6 and 7 until damper reservoir is full of fluid.

Step 9. Use flat-tip screwdriver to install damper housing plug (9) and new packing (10). Tighten damper housing plug (9) (figure 75). Wipe off mark made by pencil in the previous step and remove damper assembly from the vise. Use a clean, dry rag and completely wipe all fluid from damper assembly.

Step 10. Remove lockpin (11) from reservoir piston (12).

FIGURE 75. TOPPING-OFF DAMPER FLUID RESERVOIR.



(8) *Follow-On Maintenance*. The follow-on maintenance for this procedure is to reassemble the recoil mechanism.

3. Conclusion

This task showed two examples of receiver assembly maintenance in the form of repairing the damper assembly and recoil mechanism. These examples were provided as a general explanation of the steps that a mechanic would have to follow when repairing the above components. Prior to working on the M242 machinegun, the mechanic should ensure that the required TM's are on hand and are being used. For the M242 machinegun this would include both TM 9-1005-200-20&P and TM 9-1006-200-30&P.

PRACTICAL EXERCISE 1

1. Instructions

Read the scenario and respond to the requirements that follow the scenario.

2. Scenario

Having returned from Germany, where you were assigned to a track maintenance unit, your assignment is with the U.S. Army Ordnance Center and School at Aberdeen Proving Ground as a tank turret instructor. Most of your platform time has been spent teaching various classes on the turret of the infantry fighting vehicle (IFV) and calvary fighting vehicle (CFV).

Recently, the training division was tasked with providing instructional material support for the U.S. Army Reserves. This support will send an instructional team to most of the reserves training sites to give classes on new equipment. As luck would have it, you have been blessed with presenting a class to the reserves on the M242 machinegun. After a quick review of the instructional materials you will use for the class, you find that there is no posttest. Fortunately, you have been given the needed time to develop this test. The questions which follow came from your posttest.

3. Requirement

Using your knowledge of the M242 machinegun and this subcourse, prepare an answer sheet for the questions listed below.

a. How are gum or old grease deposits removed from the M242 machinegun?

b. When inspecting the machinegun, the gaskets and seals of what part may be reused?

c. Which assembly of the M242 machinegun rams and fires the rounds, extracts and ejects spent cartridge cases, and suppresses the recoil force from the barrel and breech?

d. A component of the forward feed assembly is the round positioner. What function does this component perform?

e. What subassembly of the receiver assembly engages the sear to stop the bolt from being unlocked from the breech if there is no recoil?

f. What three components make up the electrical system?

g. What tool is used to remove a ball bearing from the wormshaft assembly?

h. What action should be taken before a component of the machinegun is placed into a vise?

i. How many pounds per square inch gage (psig) is used to pressurize the damper assembly during testing?

LESSON 1. PRACTICAL EXERCISE - ANSWERS

1. Requirement

a. Gum and old grease are removed from the machinegun by soaking the parts in cleaning solvent. Minor surface defects are removed with a brush and crocus cloth.

b. The gaskets and seals may be reused on the electrical parts.

c. The receiver assembly.

d. The round positioner guides and positions the rounds during transfer from sprocket to rotor.

e. The mechanical interlock.

f. The electrical system consists of the motor, solenoid, and cable assembly.

g. The tool that is used to remove a ball bearing is an outside mechanical puller.

h. Protective jaw caps are placed on the vise before a component is put into the vise.

i. The damper assembly is pressurized with 100 psig.

REFERENCES

REFERENCES

The following documents were used as resource materials in developing this subcourse:

TM 9-1005-200-20&P
TM 9-1005-200-30&P
TM 9-2350-252-10-2